

Simrad SX90

Product description

This document provides a general description of the Simrad SX90 Fish finding sonar. It also provides presentation examples, the technical specifications, and the outline dimension drawings required for installation.

History

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Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to install, operate or work on the equipment.

Kongsberg Maritime AS disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

Support

If you require maintenance on your Fish finding sonar system contact your local dealer. You can also contact us using the following address: contact@simrad.com. If you need information about our other products, visit our web site. On the web site you will also find a list of our dealers and distributors.

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The logo for SIMRAD, featuring the word "SIMRAD" in a bold, red, sans-serif font.

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SIMRAD SX90

Study this chapter to familiarize yourself with the Simrad SX90 Fish finding sonar system.

Topics

- *Basic information* on page 5
- *Main units* on page 6
- *System diagram* on page 9
- *Basic functionality* on page 10

Basic information

The Simrad SX90 is a long range omnidirectional low frequency sonar. It is designed for medium and large sized fishing vessels, preferably for purse seiners, but it is also well suitable for trawlers. The sonar allows you to choose an operational frequency between 20 to 30 kHz (in 1 kHz steps). The cylindrical multi-element transducer allows the omnidirectional sonar beam to be tilted electronically from +10 to –60 degrees. This allows you to automatically track schools of fish, and to observe the whole water volume around the vessel. A stabilising system is included for electronic pitch and roll compensation.

Great emphasis has been placed on giving the best possible presentations on a high resolution colour display. The Processor Unit is controlled by Microsoft's Windows XP® operating system, which result in a flexible choice of display modes for a large range of user applications.

The signal processing and beamforming is performed in a fast digital signal processing system using the full dynamic range of the signals. In addition to the traditional single frequency transceiver system, the Simrad SX90 contains an advanced frequency modulated filter system (FM).

Main units

The Simrad SX90 comprises the following main units:

- Normally installed in the wheelhouse:
 - *Colour Monitor*
 - *Operating panel*
 - *Processor Unit*
 - *Beamformer Unit*
 - *Audio amplifier with loudspeakers (option)*
- Normally installed in the sonar room:
 - *Transceiver Unit*
 - *Hull Unit*

Wheelhouse units

Colour Monitor

The **Colour display** is a high-resolution monitor. In addition to the sonar picture, the monitor will also display the user menus for the interactive operation. In order to ease the situation comprehension, certain colours have been chosen to better the distinction between the various elements in the scene.

The colour display is not a part of the sonar delivery, and it must be purchased locally.

Operating panel

The **Operating Panel** contains all necessary control functions for operating the sonar. The controls are arranged in function groups, which gives a clear and easy operation.

Figure 1 Operating panel



Note that all sonar operation also may be made from the trackball, or by means of an optional standard computer mouse.

Processor Unit

The **Processor Unit** is a marine computer based on the Microsoft Windows XP® operating system. It is designed for rugged use, and placed on shock absorbers. The computer is based on a commercial design, but the software and hardware has

been specified and assembled by Simrad to suit the SX90 sonar requirements. The computer holds a DVD player to be used for future software upgrades.

Figure 2 Processor Unit



The purpose of this computer is to allow you to control the sonar. It provides the graphic presentation of the sonar modes and the images created, it holds the menu system, it communicates with the Operating Panel, and reads information from peripheral units by means of the Interface Unit.

The Processor Unit communicates with the Beamformer Unit using a single Ethernet cable.

Beamformer Unit

The **Beamformer Unit** is a marine computer, which runs the Microsoft Windows XP® operating system. The software and hardware has been specified and assembled by Simrad to suit the SX90 sonar requirements. The computer holds a CD player to be used for future software upgrades.

The purpose of this computer is to perform the advanced signal processing required to present the information on the Processor Unit.

The Beamformer Unit communicates with the Transceiver Unit in the sonar room using a single Ethernet cable.

Audio amplifier with loudspeakers

An amplifier with one or two loudspeakers may be connected to the Beamformer Unit to provide the audio output.

These optional items are not provided with the standard sonar delivery.

If standard commercial PC loudspeakers are used, these are normally powered by a separate power supply.

Sonar room units

Transceiver Unit

The SX90 Transceiver Unit is located in the sonar room, close to the Hull Unit.

The transceiver performs the transmission and reception control of the 256 transmitters and 256 receiver channels. Eight identical transceiver boards are used. The Transceiver Unit also holds two power supplies, an Ethernet switch, and a large capacitor bank. One Ethernet cable is used for communication with the wheelhouse, and a second Ethernet cable is used to control the hull unit.

The transducer cables from the hull unit are plugged into the side wall of the Transceiver Unit cabinet using a special plug.

The Transceiver Unit is mounted on the bulkhead using powerful shock absorbers. The connectors for power and interface are located at the bottom of the cabinet.

Hull Unit

The standard **SX92 Hull Unit** is designed to lower the transducer 1.2 meters below the ship's hull, while an optional hull unit will lower the transducer to 1,6 meters below the hull.

The transducer can also be lowered to any selected middle position. In case of voltage failure, the transducer can be raised or lowered manually by means of a hand crank.

The sensor for the electronic stabilisation of the sonar beams is housed in the Motor Control Unit, which is mounted on the Hull Unit.

Transducer

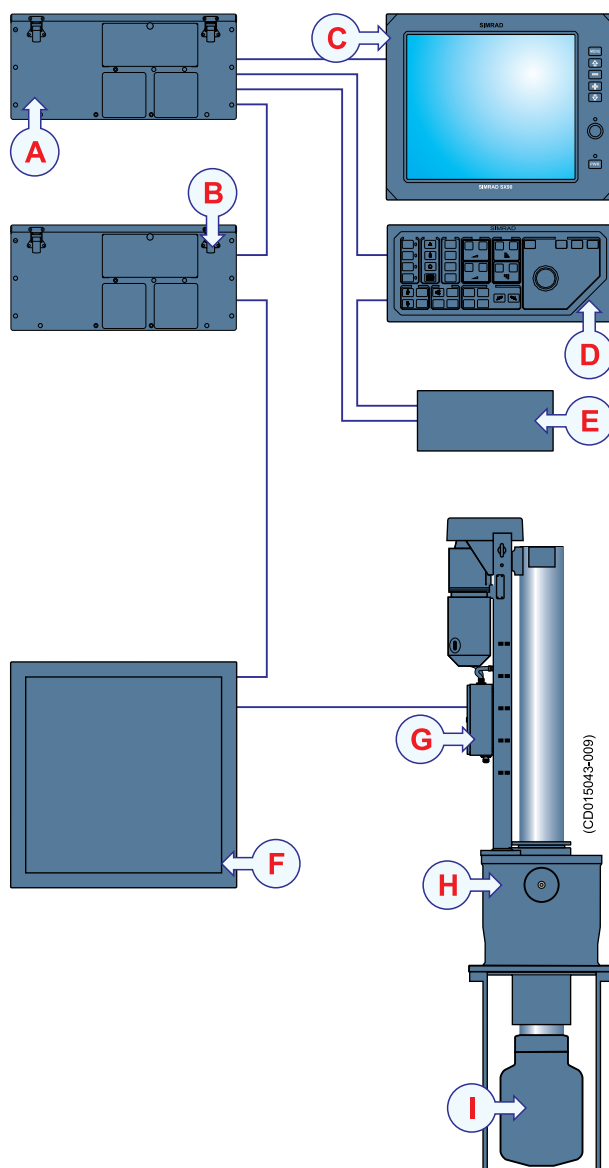
The cylindrical **Transducer** allows the sonar beam to give full 360 degrees coverage of the water volume down to -60 degrees.

System diagram

Figure 3 SX90 Simplified system diagram

SX90 items

- A Processor Unit
- B Beamformer Unit
- C Colour Monitor
- D Operating panel
- E Transceiver Unit
- F Motor Control Unit (mounted on the hull unit)
- G Hull Unit
- H Transducer (mounted on the hull unit)



Basic functionality

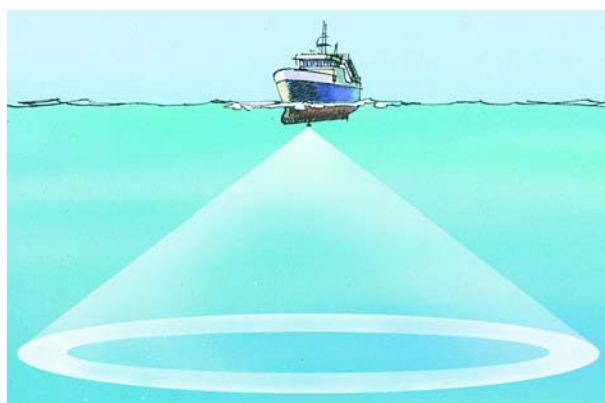
The basic principles of the Simrad SX90 are unique because of the 256 separate transmitter and receiver channels with their transducer elements spread around on the cylindrical transducer.

The transmission, reception and data processing are under computer control, and the powerful capabilities of the sonar are the results of sophisticated digital signal processing software and state of the art hardware.

Omni beam

When the *Omni* beam is tilted, the total beam picture can be compared with folding an umbrella, which means that all beams in 360 degrees around the vessel have the same tilt angle.

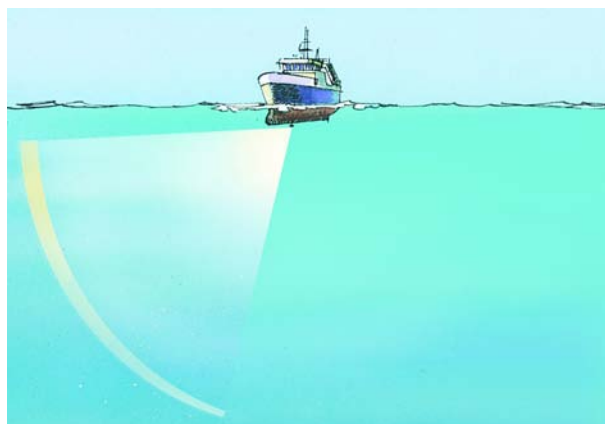
Figure 4 Omni beam principle



The beam can be tilted from +10 up to -60 degrees down.

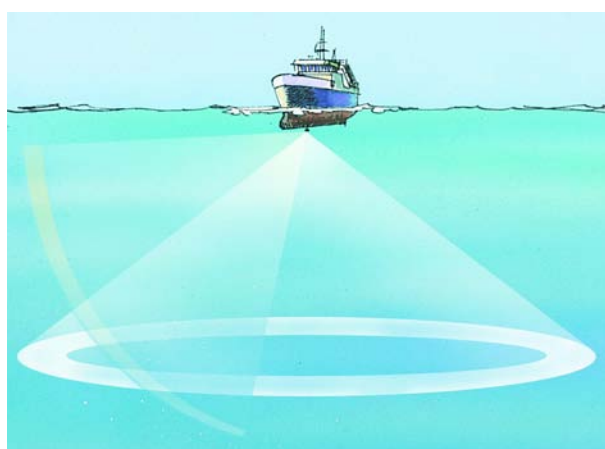
In addition to seeing the target from above, it is also possible to see the target from the side, by using the vertical slice presentation. In this case the beam covers a continuous vertical beam from 0 to -60 degrees in one transmission.

Figure 5 60 degrees vertical slice



This vertical slice, which is presented by the white audio line in the horizontal picture, can be selected to any bearing by the manual training control. The combination of the Omni mode and the vertical slice will give an optimal visualization of the catch situation.

Figure 6 Omni/vertical combination



In addition to the *Omni* picture, the vertical slice is especially useful for visualizing the vertical distribution of a school of fish. In that way, it is not necessary to go over the target to see the distribution on the echo sounder, which often results in a spreading of the school.

Multiple frequency operation

In addition to the standard 26 kHz frequency, you can select any operational frequency from 20 to 30 kHz in 1 kHz steps.

This is a very useful function when it is necessary to suppress interference from other sonars.

Stabilisation system

The Simrad SX90 is provided with a stabilisation system.

When the beam stabilizer is activated, both horizontal and vertical beams will be stabilized electronically for roll and pitch movements up to ± 20 degrees. The beam direction will then change continuously according to the vessel's movements, and secure an optimal contact with the targets even in rough seas.

Figure 7 Stabilisation system



Reception

A great effort has been made to reduce unwanted noise to get a clean and stable echo presentation. To achieve this goal the sonar receiver has the following filtering possibilities:

- FM Correlation filter
- Frequency selection
- AGC (Automatic Gain Control)
- RCG (Reverberation Controlled Gain)
- Ping-to-ping filter
- TVG (Time Variable Gain)
- Noise filter

FM Correlation filter

The FM (frequency modulation) is a sweep in frequencies. The receiver filters out those signals that are the same as the transmitted. This provides a filtering effect, which efficiently reduces interference, noise and reverberation. In addition to giving a clean and stable echo presentation, this will normally also increase the sonar's detection range. The advantage of the FM correlation filter is that it retains the high resolution in range with long pulse lengths and high energy, and that it is not sensitive to moving targets.

Frequency selection

The multiple frequency selections can be used for suppression of interference from other sonars.

The sound absorption in salt water increases with the frequency, thus giving the lower frequencies a longer detection range.

AGC (Automatic Gain Control)

The AGC (Automatic Gain Control) senses the echo level in several directions, and use this as a basis for adjusting all the receiver beams. The AGC will thus provide automatic scaling of the data in order to maintain proper dynamic range based on all echo values

The strength of the filter can be selected in the menu.

RCG (Reverberation Controlled Gain)

The RCG function adjust the picture to minimize influence from bottom and surface reverberation.

The strength of the filter can be selected in the menu. With maximum strength is selected, the RCG will effectively reduce the bottom in shallow water, while variations on the bottom will be displayed. Note that scattered fish can be perceived as reverberation. The RCG filter must therefore be used with care if scattered schools are to be detected.

Ping-to-ping filter

Thee Simrad SX90 is equipped with a ping-to-ping filter (PP Filter) to provide a clean and steady presentation by reducing the interference and noise. This filter compares the echoes from a selected amount of transmissions (pings), and an echo has to be present in the selected amount of pings in order to be presented on the display.

Note that in rough seas, when the beam easily can miss the target in several pings, the PP Filter must be used with care.

TVG (Time Variable Gain)

The Time Variable Gain (TVG) function controls the gain of the receiver so that a school with a given size and density is presented with approximately the same strength on the display, inside the regulated TVG range. This can also be seen as a filter, because it reduces the noise close to the vessel. The regulated strength of the TVG can be selected in the menu.

Noise filter

The noise filter is designed to remove unwanted acoustic noise from the sonar picture. It will reduce the interference from other acoustic systems (sonars and echo sounders) on your own vessel and from other vessels in the vicinity. It will also suppress the noise from your own propellers and from other similar noise sources.

Transmission

The transmission is controlled by the Processor Unit. The parameters you have chosen are used.

There are 256 separate transmitters in the unit distributed on eight transceiver circuit boards.

Each transmitter is individually addressed and controlled from the signal processor. The controlled parameters include power output and time delay for each transducer element in order to form a beam with the selected tilt angle.

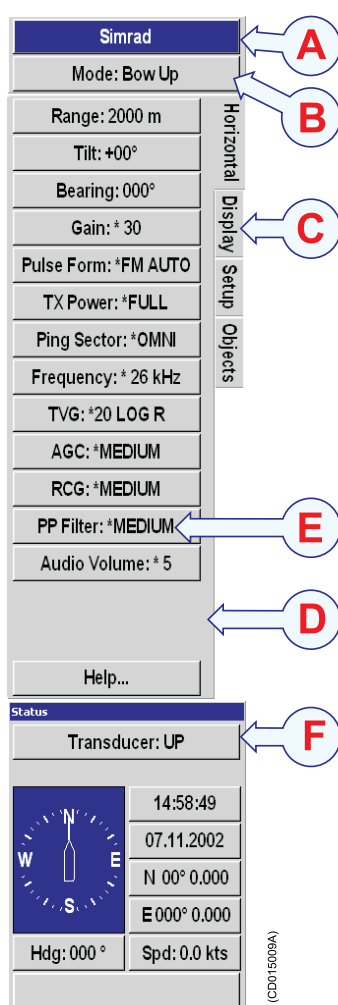
When the stabilising system is active, the tilt angle for each beam will automatically be corrected relative to the vessel's pitch and roll movements.

MENU SYSTEM

The Simrad SX90 Fish finding sonar comprises a large number of different menus on several levels. Menus are selected by pressing their respective tabs on the right hand side, and the appearance of menus and tabs depends on the chosen operational mode and the current settings.

Each menu button displays the current parameter setting. The menu system is available in several languages.

Figure 8 Menu elements



OPERATING PANEL

The most frequently used functions are directly accessible by the designated control buttons on the Operating Panel, and may enter operational commands directly. The buttons are grouped in fields according to their purpose. Most sonar functions are also accessible and activated using the menu system on the display and the trackball and **Select** button on the Operating Panel.

Figure 9 Operating panel



- A Main switch:** Power the sonar on (and off), lower the transducer
- B Symbol:** Control the target markers providing exact latitude and longitude positioning.
- C Mode:** Select your favourite display mode or user setting with the push on a button.
- D Gain:** Separate gain control for vertical and horizontal sonar presentation.
- E Range:** Separate range control for vertical and horizontal sonar presentation.
- F Cursor:** Menu and cursor control.
- G Tilt:** Easy control of the sonar's tilt angle, or start automatic search program.
- H Various:** Store interesting screen captures, and zoom in on details.
- I Train:** Manual control of beam training, start automatic search and tracking programs.

EXAMPLES

This page presents several screen captures taken from actual operations on fishing vessels.

Figure 10 Herring

On this screen capture, you can see that the sonar has detected three schools of herring. The skipper has decided to catch the school with highest density, and this is the school closest to the vessel. The sonar is in **Automatic Target Tracking** mode, and shows the tracks from the school and vessel. In the lower left corner you can see the course, depth and speed of the school; 179 degrees, 350 meters depth and 2,2 knots.

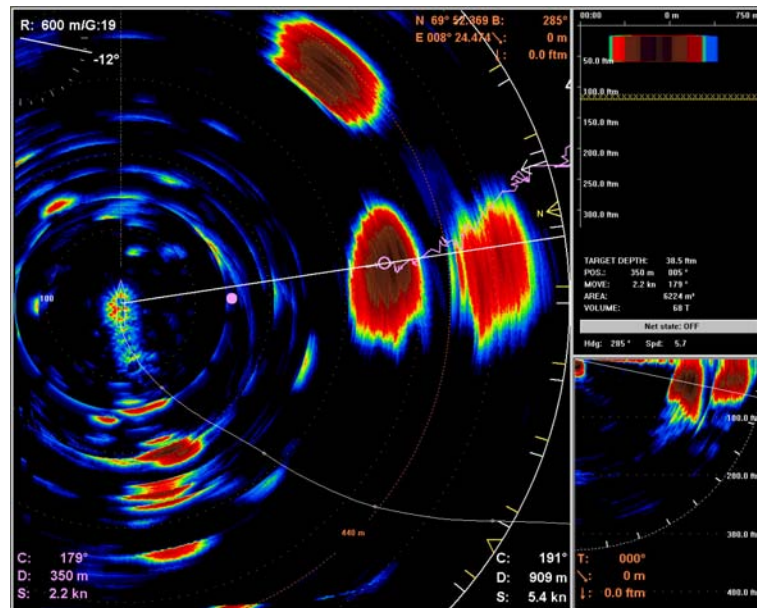


Figure 11 Horse mackerel

The sonar is operated in **270° Horizontal/ Vertical** mode. The school is horse mackerel travelling at 2.5 knots at 314 degrees. Tracks from the vessel and school is clearly indicated. The sonar is operated in **Automatic Target Tracking** mode. The vertical presentation indicates that the school is located close to the bottom. Note the variation in the bottom echo, this indicates hard and soft bottom spots.

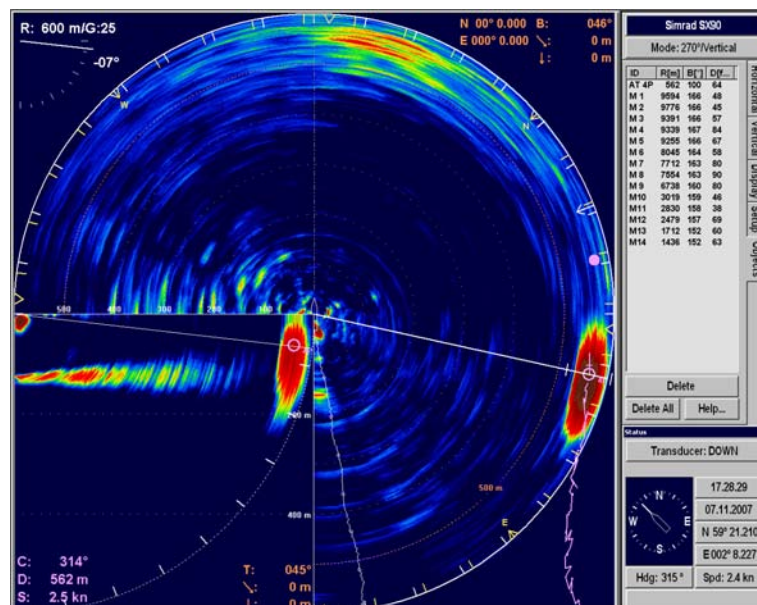
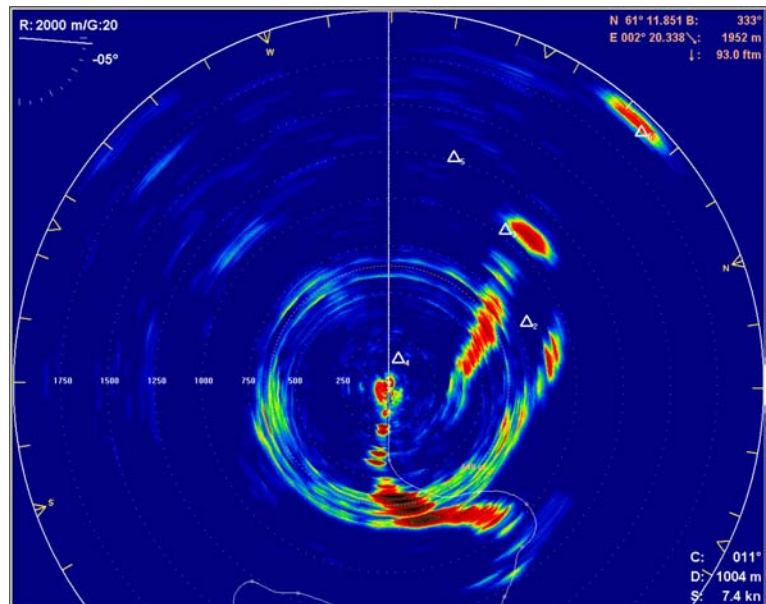


Figure 12 Mackerel (1)

This image shows a school of mackerel detected at 40 degrees starboard and marked as target "6". The sonar is operated in **Bow Up** mode with full screen view. The operational range is 2000 meter, and the vertical tilt is set to 5 degrees. The distance to the school is 1952 meters, and the depth is indicated to be 93 fathoms. This means that the mackerel school is located on the bottom. Operational frequency is 30 kHz, and Hyperbolic FM is used. The echoes shown between the mackerel and the vessel is wake from a pair of trawlers arriving at the scene.

*Figure 13 Mackerel (2)*

This is the same scenario as above (1), but later. The vessel is closer to the school of mackerel, now only about 250 meters away. **Bow Up/180 Vertical** mode is used. The vertical view shows the school at approximately 50 fathoms depth. The variation in bottom shows uneven spots with hard and soft bottom. The operational frequency is 30 kHz, and Hyperbolic FM is used.

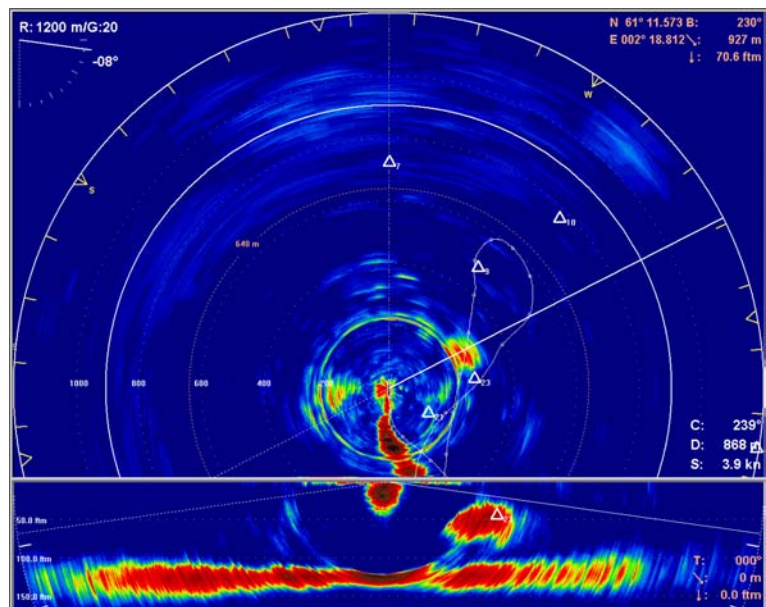


Figure 14 Tuna detection in the Atlantic Ocean (1)

The screen capture from a Spanish vessel operating in the Atlantic Ocean shows scattered Yellow fin tuna very close to the surface. The school was first detected at around 1200 meters. The sonar uses Hyperbolic FM mode. The frequency is set to 28 kHz with narrow transmitter and receiving beams.

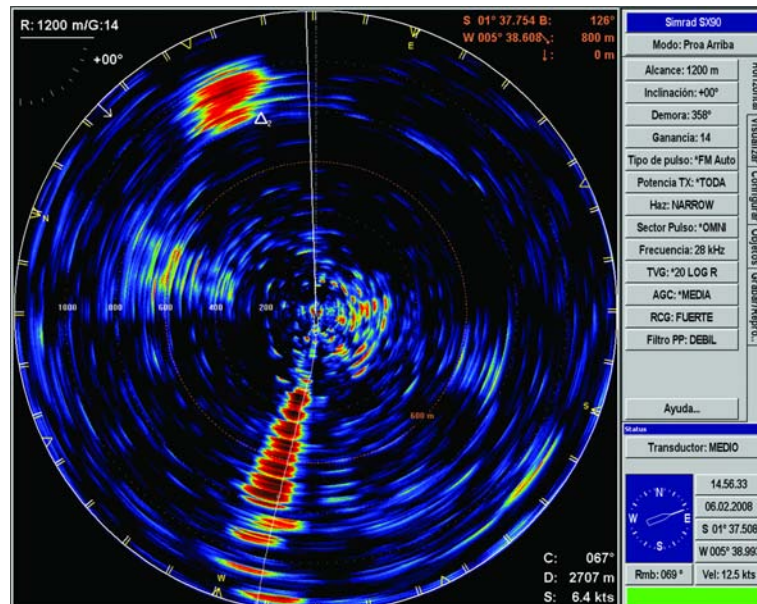
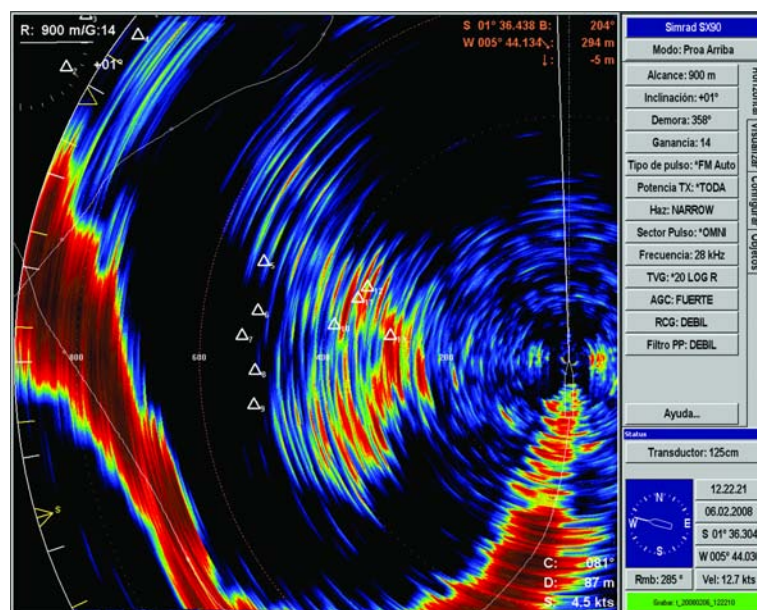


Figure 15 Tuna detection in the Atlantic Ocean (2)

The vessel is now preparing to set the seine. The sonar presentation shows spread Yellow fin tuna close to the vessel on its port side. The fish is spread out over an area from 200 meter to almost 600 meter from the vessel. Echoes from the propeller water are clearly seen behind, and on the port side of the vessel. The tilt is set at plus 1 degrees as the tuna swim very close to the surface. The sonar uses Hyperbolic FM mode, and the frequency is set to 28 kHz with narrow transmitter and receiving beams. Total catch was 26 tons of tuna.



TECHNICAL SPECIFICATIONS

This chapter provides the technical specifications and requirements related to the Simrad SX90 Fish finding sonar.

Topics

- *Power specifications* on page 20
- *Weights and outline dimensions* on page 21
- *Environmental specifications* on page 23
- *Performance specifications* on page 24

Power specifications

This section provides the technical specifications and requirements related to the AC mains supply.

Processor Unit

- **Voltage:**
 - **Nominal:** 115/230 Vac single phase, selectable
 - **Deviation:** 15% of nominal voltage
 - **Transient:** 20% of nominal voltage, recovery time 3 s
- **Power consumption:** 150 VA
- **Frequency:** 47 → 63 Hz

Beamformer Unit

- **Voltage:**
 - **Nominal:** 115/230 Vac single phase, selectable
 - **Deviation:** 15% of nominal voltage
 - **Transient:** 20% of nominal voltage, recovery time 3 s
- **Power consumption:** 150 VA
- **Frequency:** 47 → 63 Hz

Operating panel

- Not applicable. This unit is not powered by AC mains.

Colour Monitor

- Not applicable. Refer to the documentation provided by the manufacturer.

Audio amplifier with loudspeakers

- Not applicable. Refer to the documentation provided by the manufacturer.

Transceiver Unit

- **Voltage**
 - **Nominal:** 230 Vac single phase
 - **Deviation:** 15% of nominal voltage
 - **Transient:** 20% of nominal voltage, recovery time 3 s
- **Power consumption:** 600 VA
- **Frequency:** 47 → 63 Hz

Hull Unit SX92/93

- **Voltage**
 - **Nominal:** 230/380/440 Vac 3-phase, selectable
 - **Deviation:** 15% of nominal voltage
 - **Deviation, 380/440 Vac:** 340 → 485 Vac
 - **Transient:** 20% of nominal voltage, recovery time 3 s
- **Power consumption:** 3000 VA
- **Frequency:** 47 → 63 Hz

Hull Unit SX95

- **Voltage**
 - **Nominal:** 230/380/440 Vac 3-phase, selectable
 - **Deviation:** 15% of nominal voltage
 - **Deviation, 380/440 Vac:** 340 → 485 Vac
 - **Transient:** 20% of nominal voltage, recovery time 3 s
- **Power consumption:** 1100 VA
- **Frequency:** 47 → 63 Hz

Weights and outline dimensions

This section provides the technical specifications and requirements related to weight and outline dimensions. For more detailed information about the dimensions, refer to *Drawing file* on page 26.

Note _____

All weights are approximate.

Processor Unit

- **Weight:** 15 kg
- **Width:** 452 mm
- **Height:** 269 mm
- **Depth:** 405 mm

- **Outline dimensions:**
 - *Processor Unit dimensions* on page 30

Beamformer Unit

- **Weight:** 15 kg
- **Width:** 452 mm
- **Height:** 269 mm
- **Depth:** 405 mm
- **Outline dimensions:**
 - *Beamformer Unit dimensions* on page 33

Operating panel

- **Weight:** 4 kg
- **Width:** 385 mm
- **Height:** 51 mm
- **Depth:** 165 mm
- **Outline dimensions:**
 - *Operating Panel dimensions* on page 36

Colour Monitor

- Not applicable. Refer to the documentation provided by the manufacturer.

Audio amplifier with loudspeakers

- Not applicable. Refer to the documentation provided by the manufacturer.

Transceiver Unit

- **Weight:** 75 kg
- **Width:** 605 mm
- **Height:** 750 mm with shock absorbers
- **Depth:** 665 mm with shock absorbers and heat exchanger
- **Outline dimensions:**
 - *Transceiver Unit dimensions* on page 27

Hull Unit SX92/93

- **Weight:**
 - **SX92:** 850 kg
 - **SX93:** 900 kg
- **Outline dimensions:**
 - *SX92 Hull unit dimensions* on page 37
 - *SX93 Hull unit dimensions* on page 38

Hull Unit SX95

- **Weight:** 500 kg
- **Outline dimensions:**
 - *SX95 Hull unit dimensions* on page 39

Installation trunk SX92/93

- **Weight:** 335 kg
- **Outline dimensions:**
 - *SX92/SX93 Optional trunk dimensions* on page 43
- **Production drawings:**
 - *SX92/SX93 Mounting trunk dimensions* on page 40
 - *SX92/SX93 Blind cover dimensions* on page 44

Installation trunk SX95

- **Weight:** 68 kg
- **Outline dimensions:**
 - *SX95 Mounting trunk dimensions* on page 42
 - *SX95 Mounting trunk production* on page 46
 - *SX95 Blind cover dimensions* on page 45

Environmental specifications

This section provides the technical specifications and requirements related to the environmental conditions.

Processor Unit

- **Operational temperature:** 0 → +50°C
- **Storage temperature:** -40 → +70°C
- **Humidity, non-condensing:** 5 → 95%

Beamformer Unit

- **Operational temperature:** 0 → +50°C
- **Storage temperature:** -40 → +70°C
- **Humidity, non-condensing:** 5 → 95%

Operating panel

- **Operational temperature:** 0 → +50°C
- **Storage temperature:** -40 → +70°C
- **Humidity, non-condensing:** 5 → 95%

Colour Monitor

- Not applicable. Refer to the documentation provided by the manufacturer.

Audio amplifier with loudspeakers

- Not applicable. Refer to the documentation provided by the manufacturer.

Transceiver Unit

- **Operational temperature:** 0 → +50°C
- **Storage temperature:** -40 → +70°C
- **Humidity, non-condensing:** 5 → 95%

Hull Unit

- **Operational temperature:** 0 → +50°C
- **Storage temperature:** -20 → +70°C
- **Humidity, non-condensing:** 5 → 95%

Performance specifications

This section provides the performance specifications for the Simrad SX90.

Operational frequency

- **Variable:** 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30 kHz

Operational range

- **Range steps:** 150 to 4500 meters in 11 steps

Tilt and tip functionality

- **Tilt:** +10 to -60° in 1° steps
- **Tip:** +10 to -90°

Transmitter

- **Number of transmitter channels:** 256
- **Transmission modes:**
 - 360° omnidirectional
 - 180° vertical
- **Pulse modes:**
 - CW (Continuous wave)
 - FM (Hyperbolic FM)

Receiver

- **Number of receiver channels:** 256

- **Digital filters:**
 - TVG (Time Varied Gain)
 - AGC (Automatic Gain Control)
 - RCG (Receiver Controlled Gain)
 - Ping-to-Ping Filter
 - Noise filter
 - FM Correlation filter

Echo presentations

- **Number of colours:** 16 or 64
- **Display resolution:** 1280 x 1024 pixels
- **Colours:** Weak, Normal or Strong
- **Palettes:** Choice of colour palettes to fit ambient light conditions

Transducer

- **Shape:** Cylindrical
- **Number of individual elements:** 256

Beams

- **Horizontal transmission:** 360 degrees
- **Horizontal reception:** 8,5 to 13 degrees
- **Vertical transmission:** 7,0 to 10,5 degrees
- **Vertical reception:** 7,4 to 11,4 degrees

Beamwidth

- **User selected:** Narrow, Normal or Wide

Stabilisation

- **Roll stabilisation:** Automatic, ± 20 degrees
- **Pitch stabilisation:** Automatic, ± 20 degrees

Interface capabilities

- Four serial lines
- Scientific output (Ethernet) [Optional]
- Additional serial lines [Optional]

DRAWING FILE

This chapter contains the installation and outline dimension drawings for the Simrad SX90 Fish finding sonar.

Note

The mechanical drawings are for information and guidance only. They are not in scale. All dimensions are in mm unless otherwise is noted.

The original installation drawings are available on PDF and/or AutoCad's DWG format. Visit www.simrad.com to download.

Cabinet outline dimension drawings

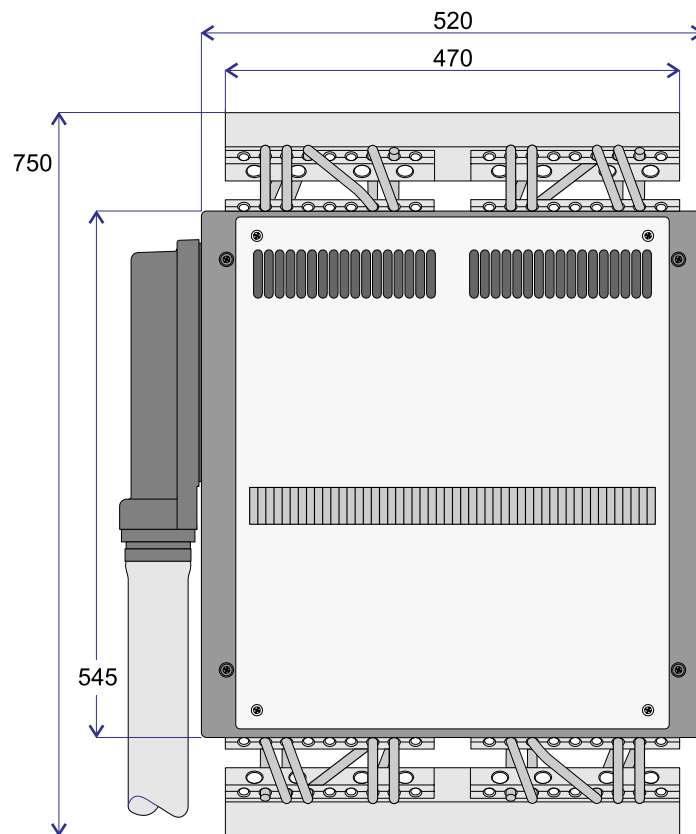
- *Transceiver Unit dimensions on page 27*
- *Processor Unit dimensions on page 30*
- *Beamformer Unit dimensions on page 33*
- *Operating Panel dimensions on page 36*

Hull unit outline dimension drawings

- *SX92 Hull unit dimensions on page 37*
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- *SX95 Blind cover dimensions on page 45*
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Transceiver Unit dimensions

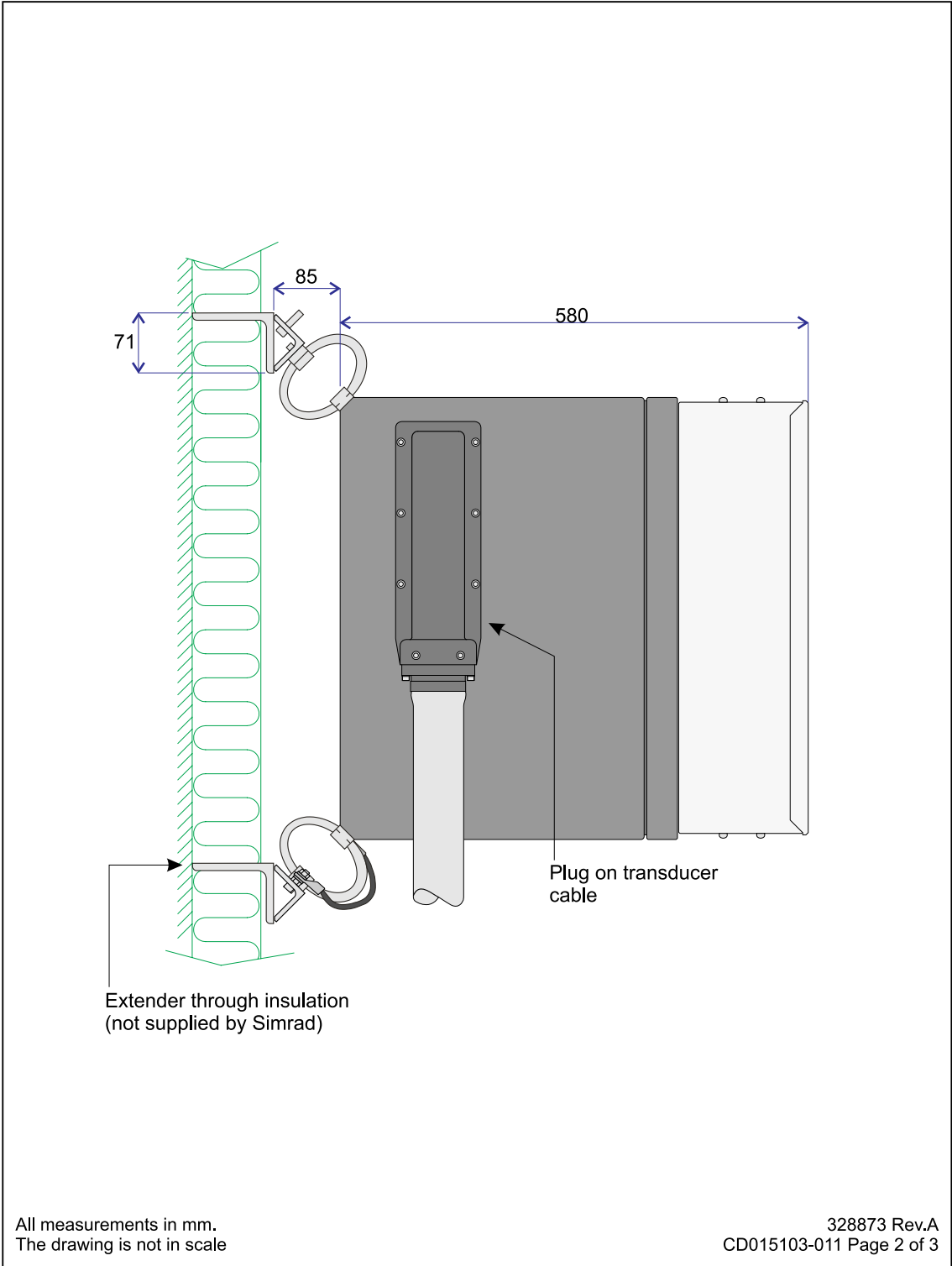
Forward view



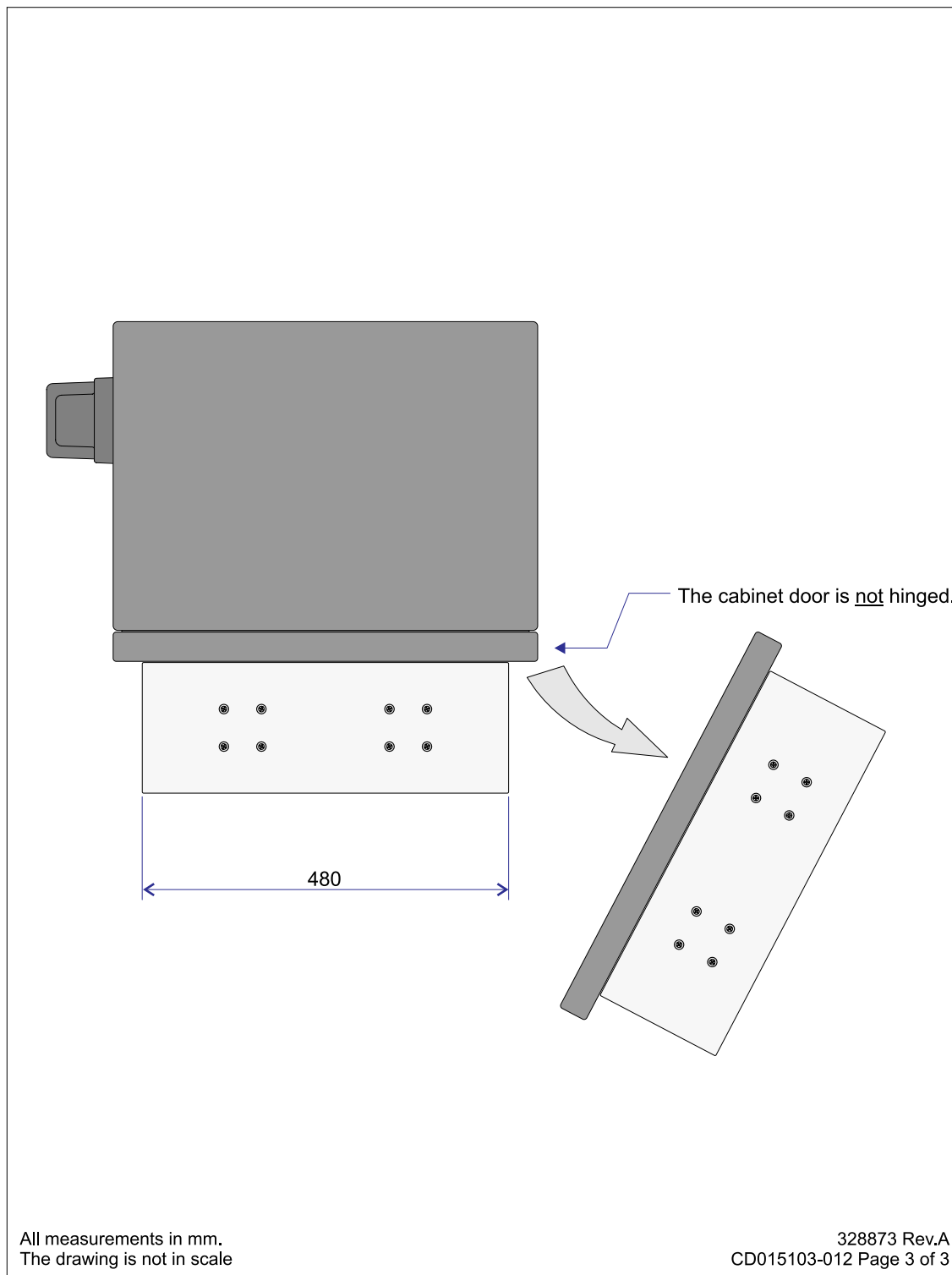
All measurements in mm.
The drawing is not in scale

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Side view

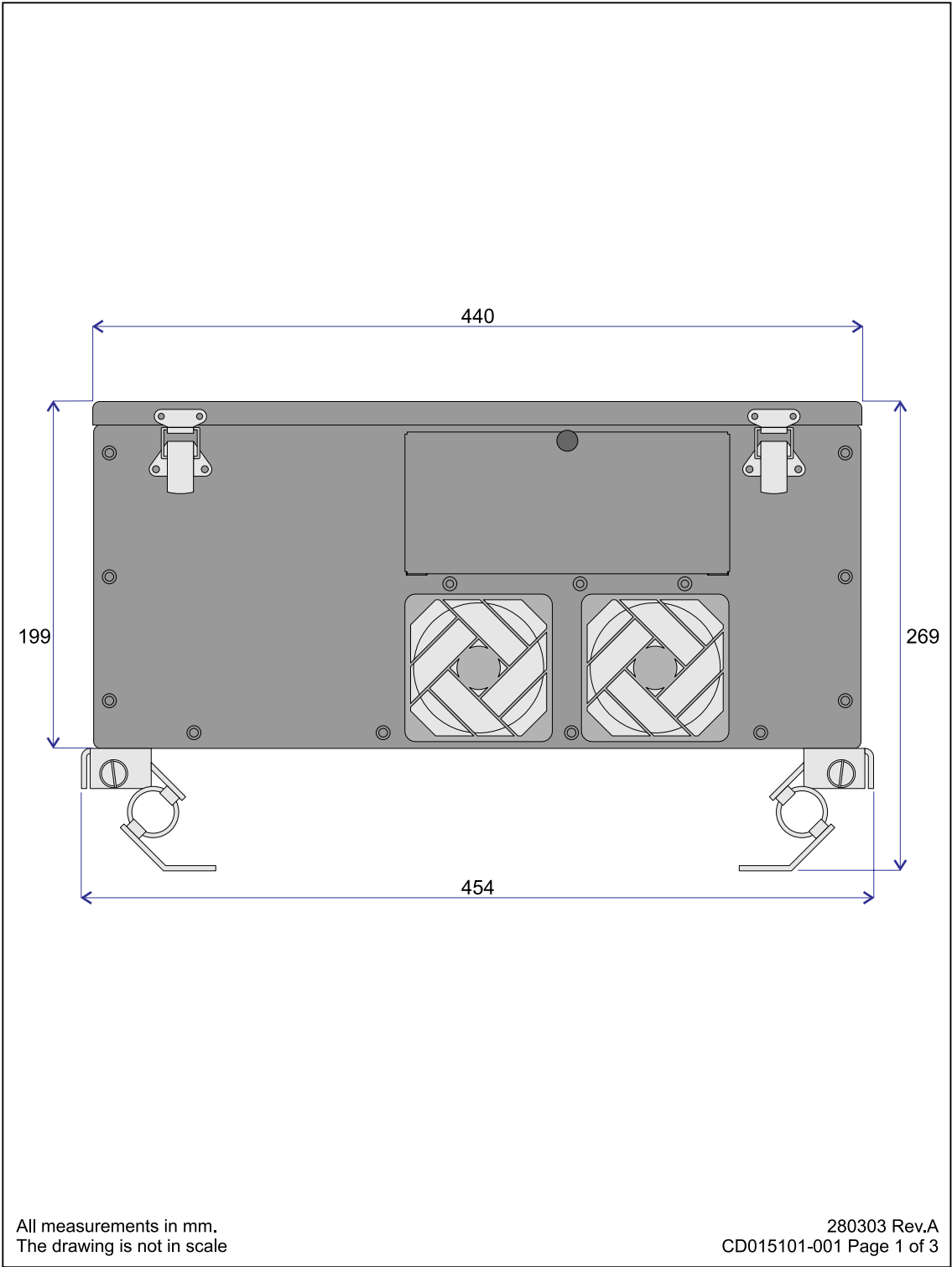


Top view

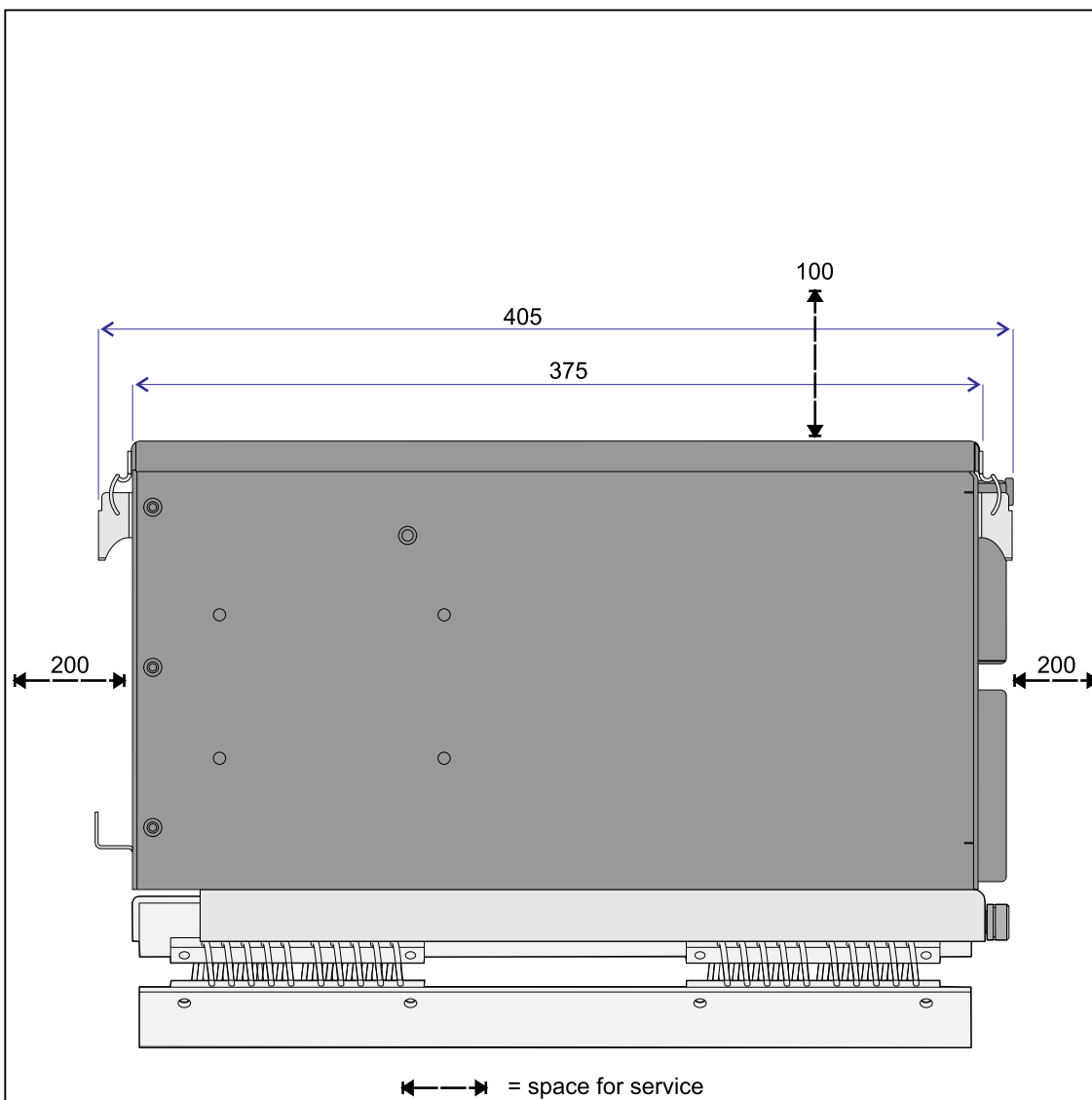


Processor Unit dimensions

Forward view



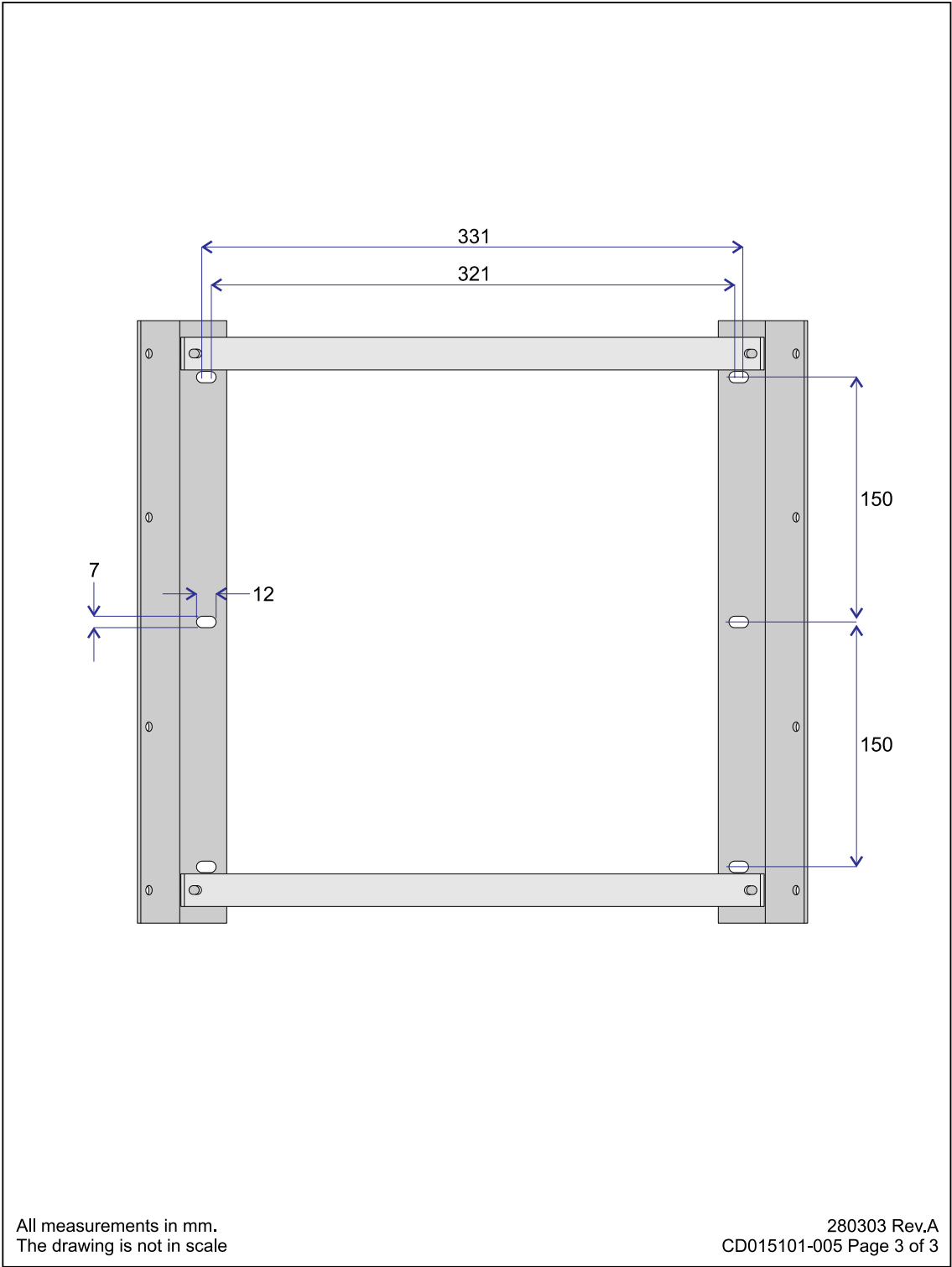
Side view



All measurements in mm.
The drawing is not in scale

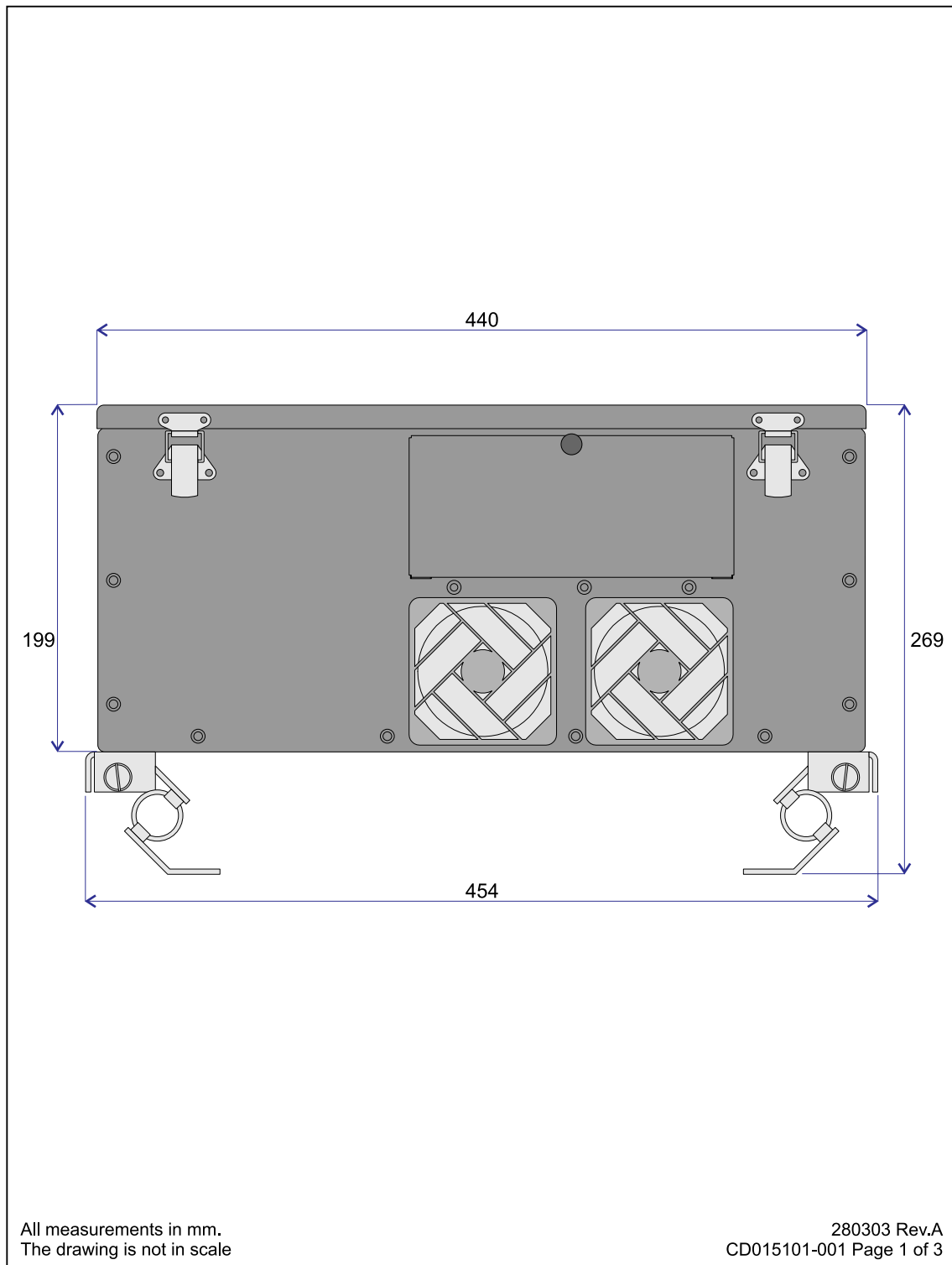
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Footprint

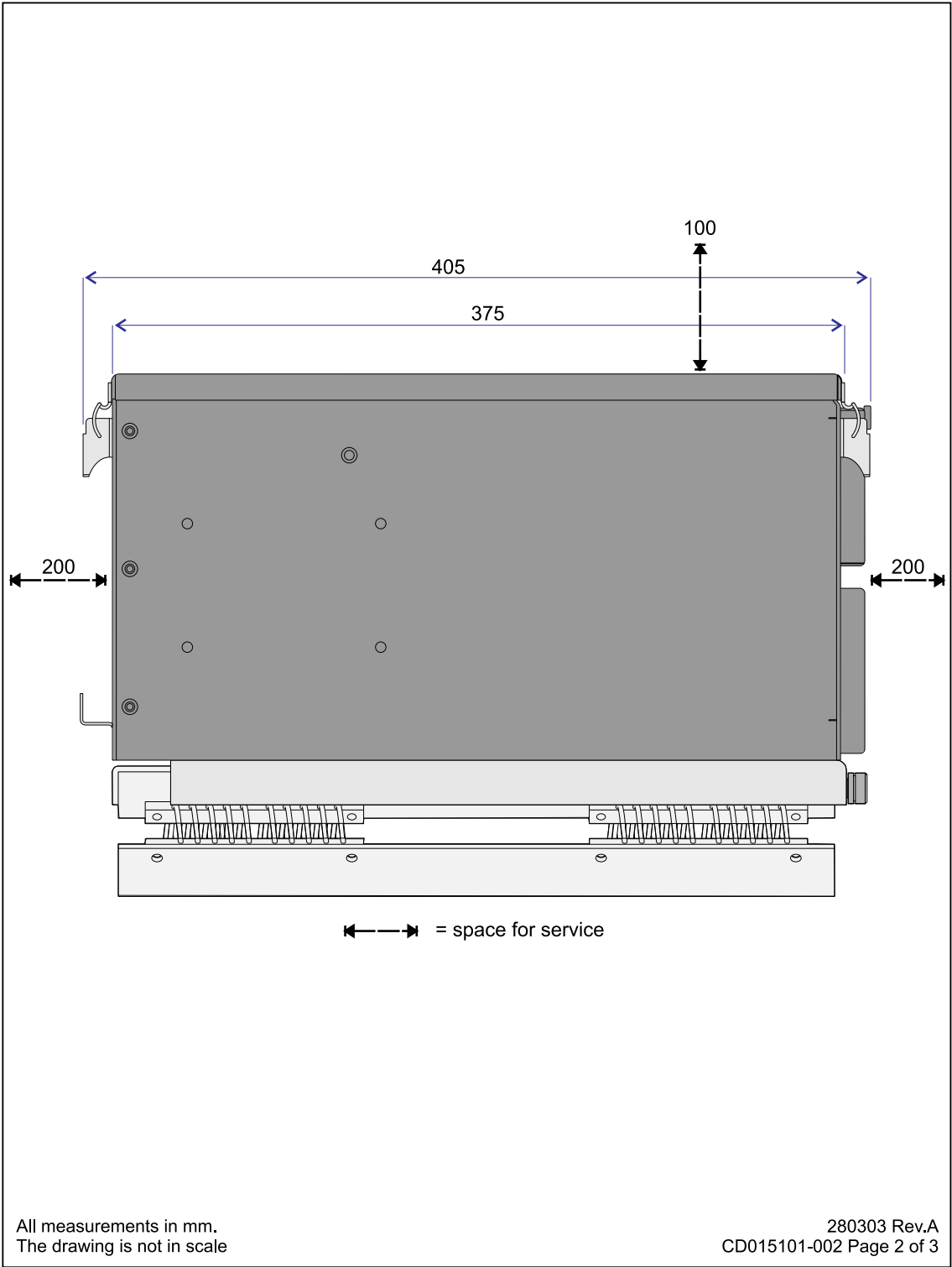


Beamformer Unit dimensions

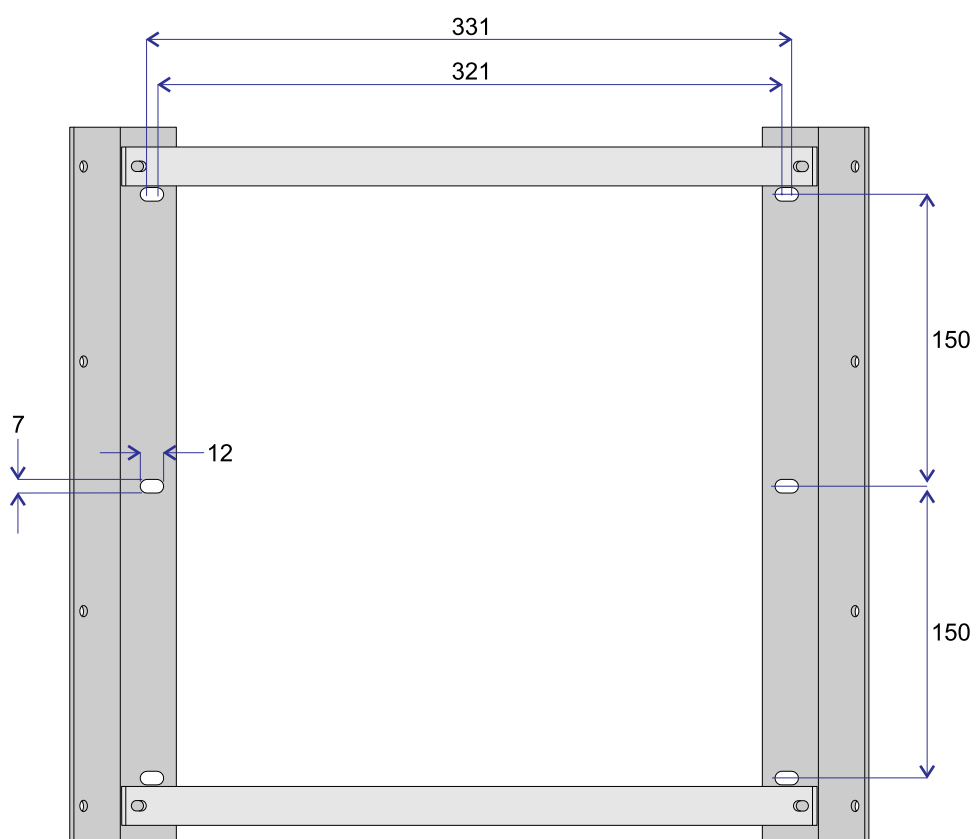
Forward view



Side view



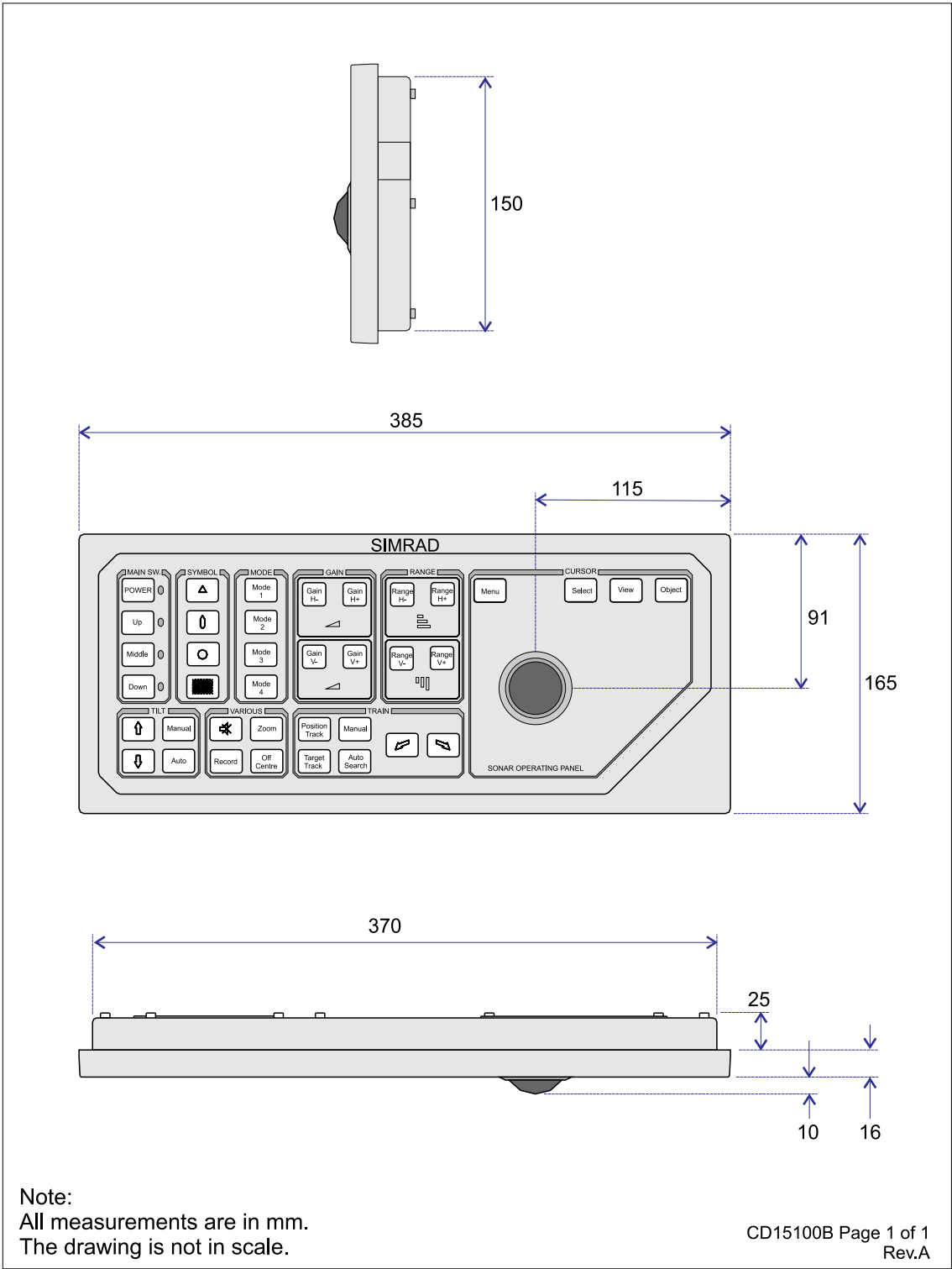
Footprint



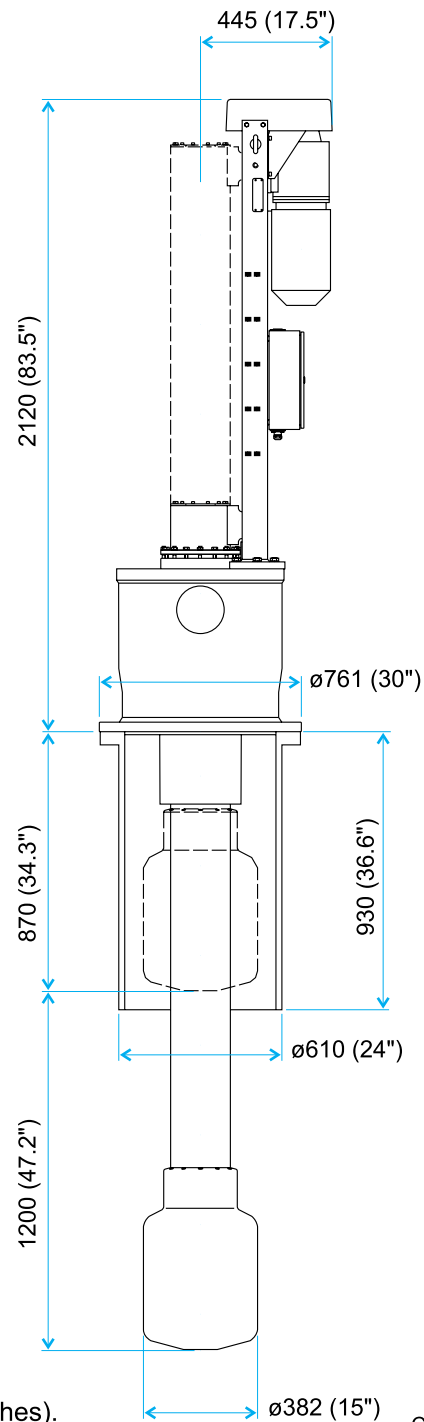
All measurements in mm.
The drawing is not in scale

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Operating Panel dimensions



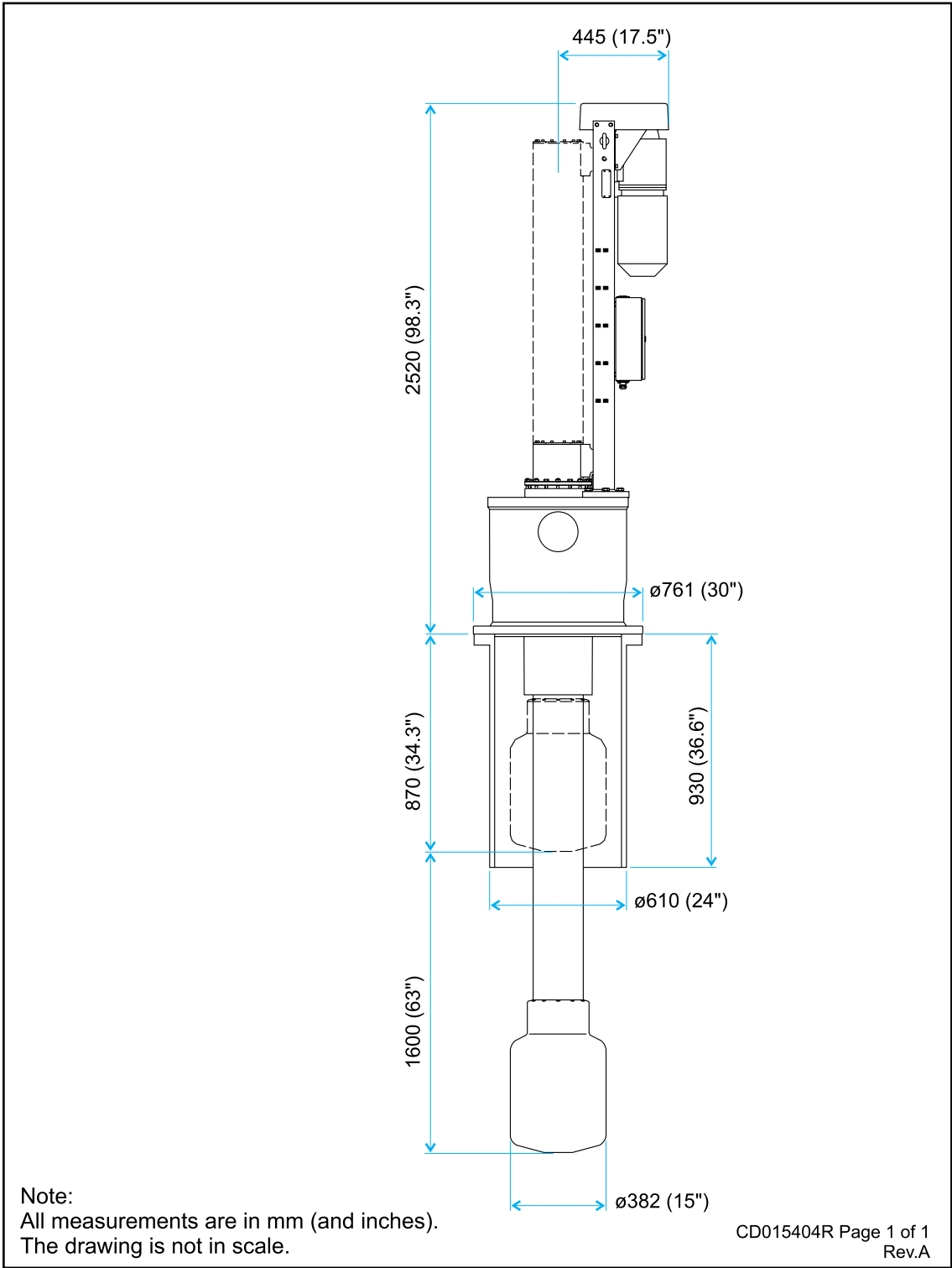
SX92 Hull unit dimensions



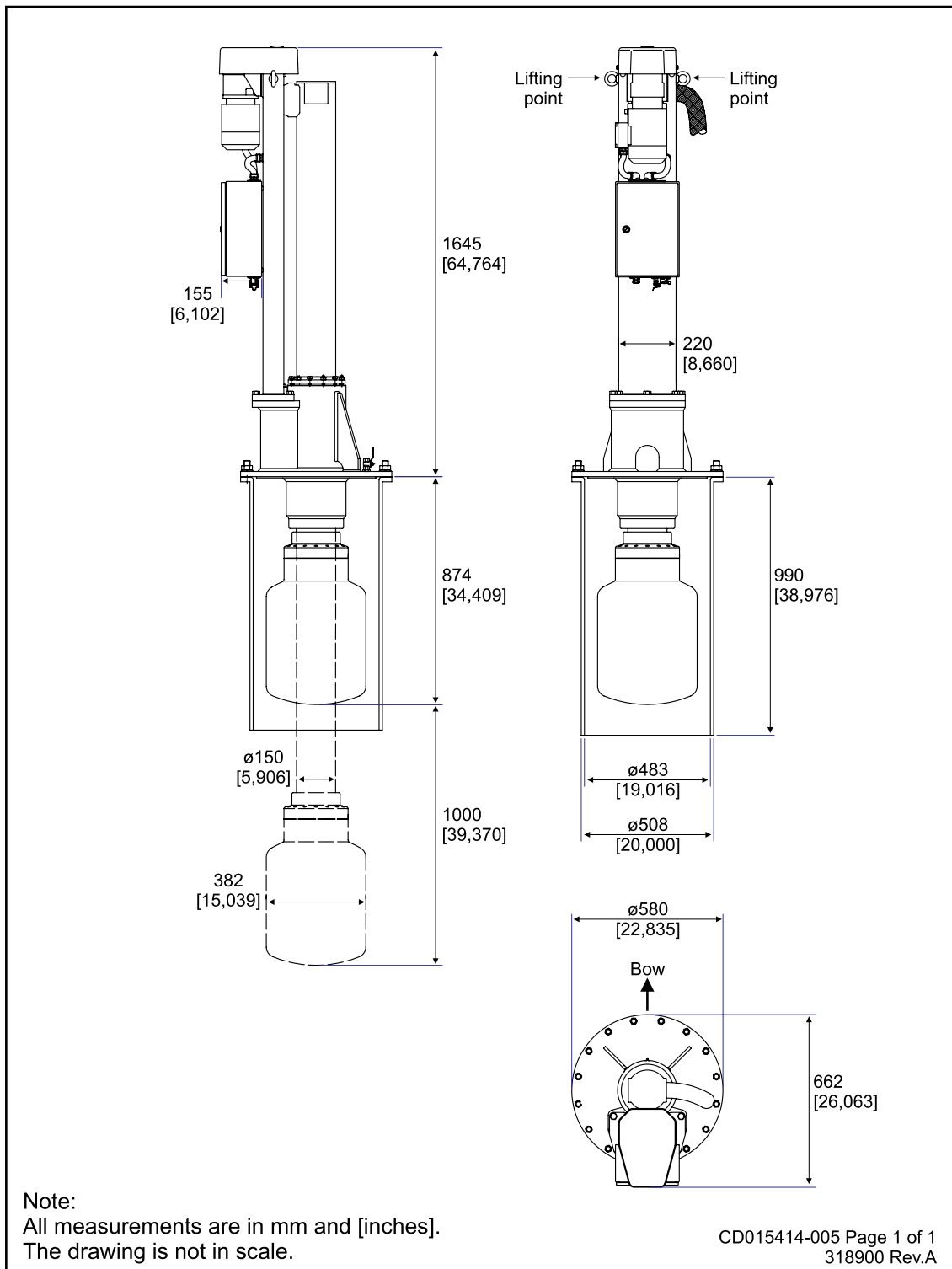
Note:
All measurements are in mm (and inches).
The drawing is not in scale.

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SX93 Hull unit dimensions

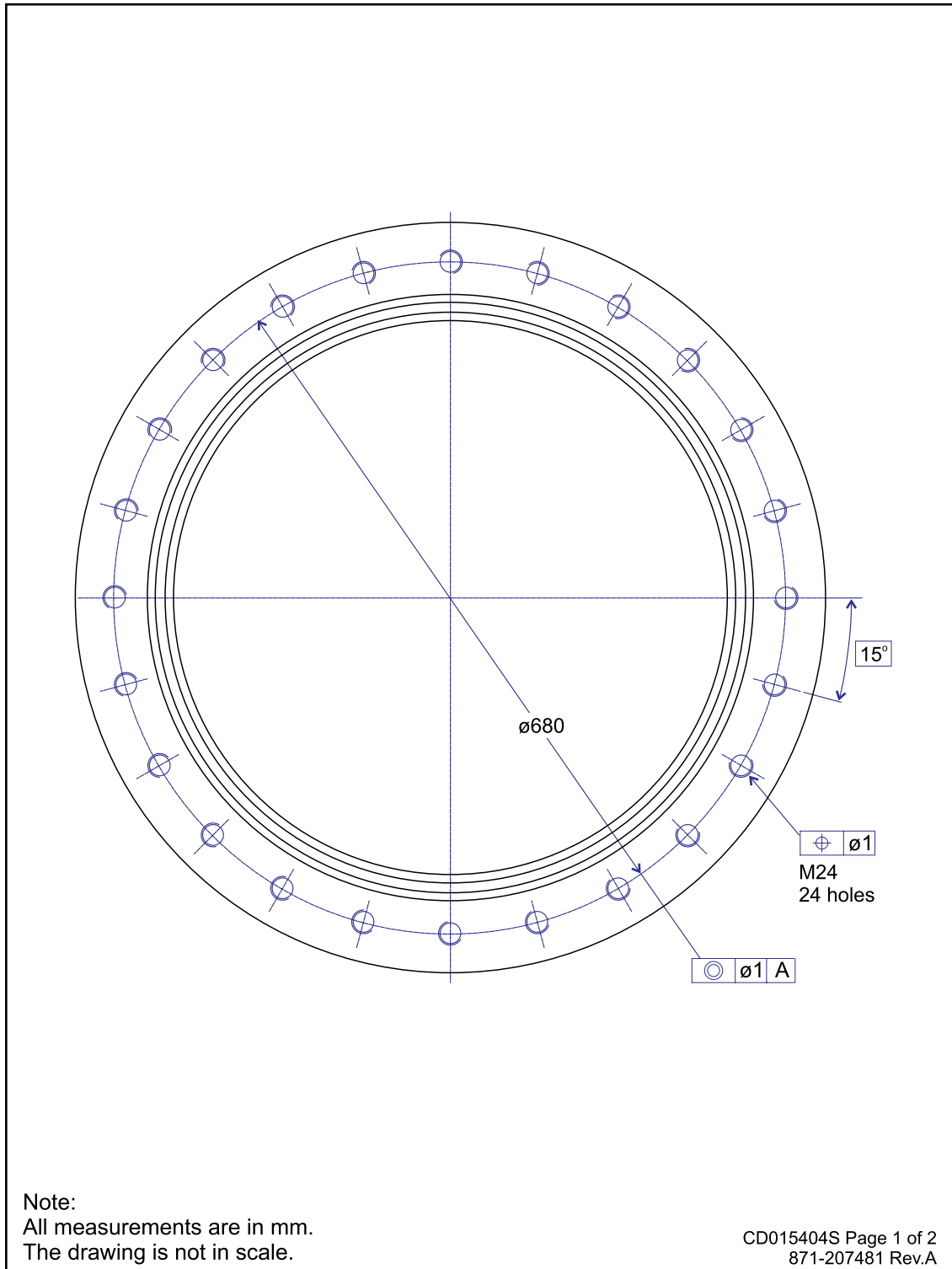


SX95 Hull unit dimensions

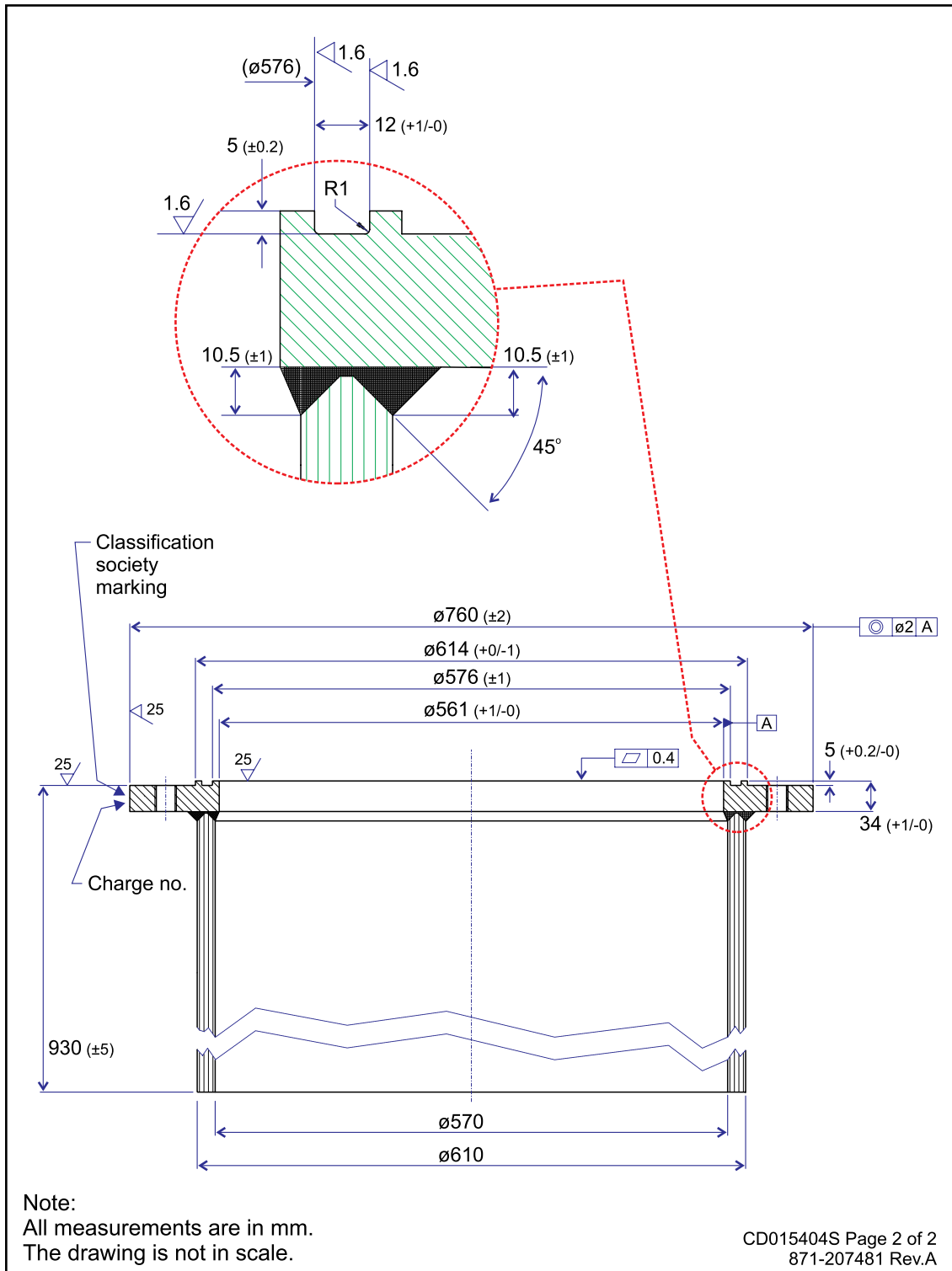


SX92/SX93 Mounting trunk dimensions

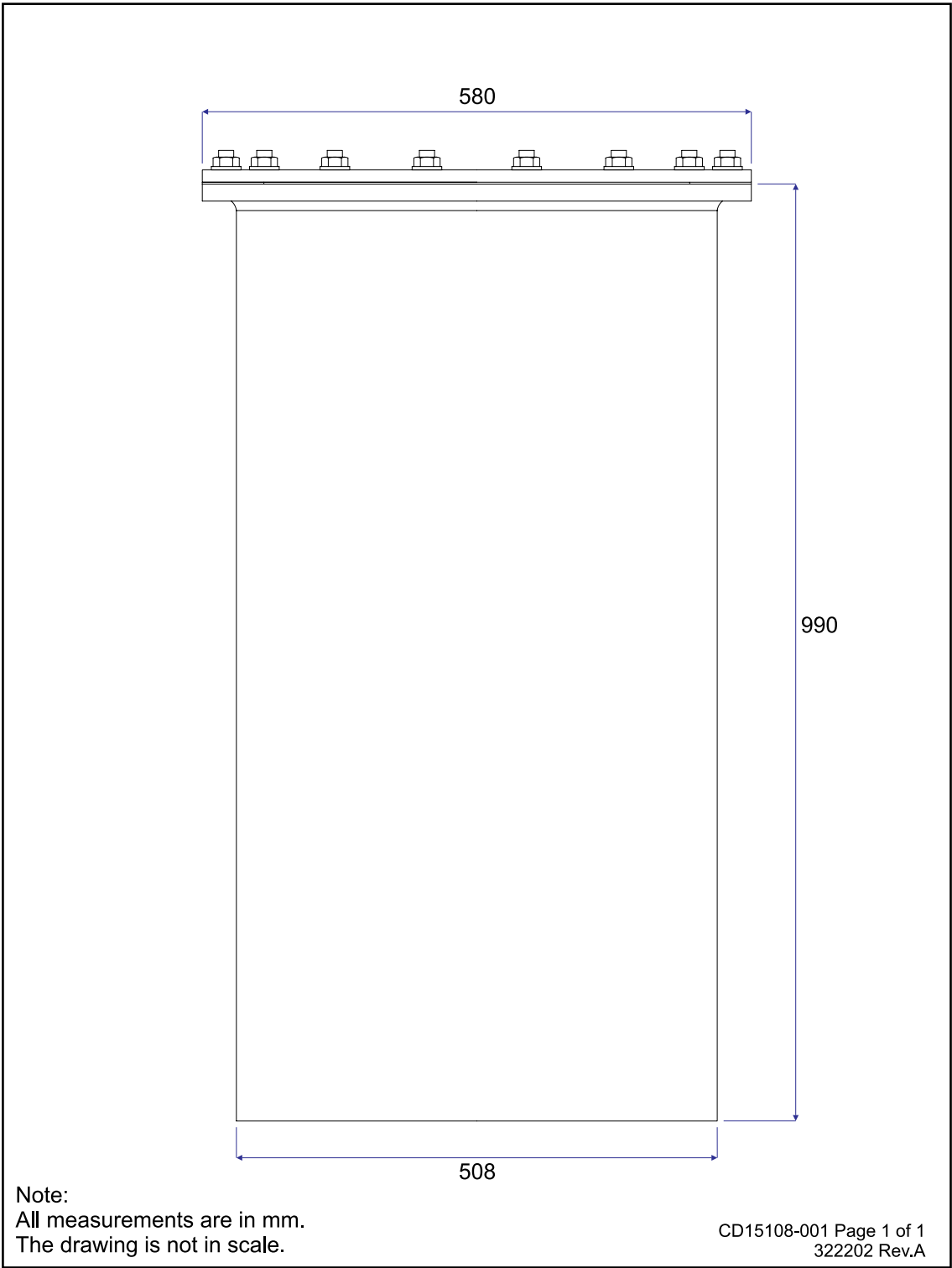
Page 1



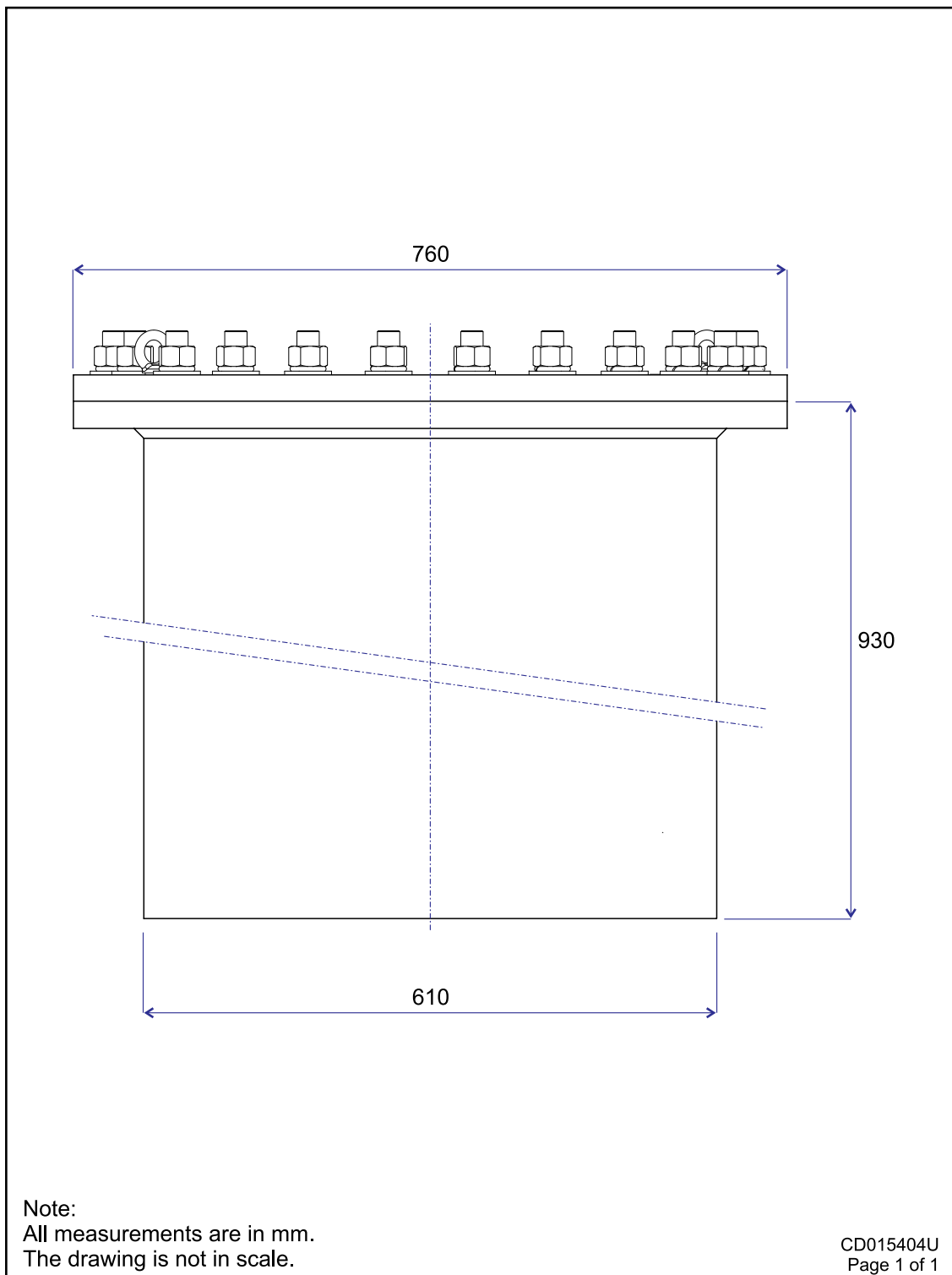
Page 2



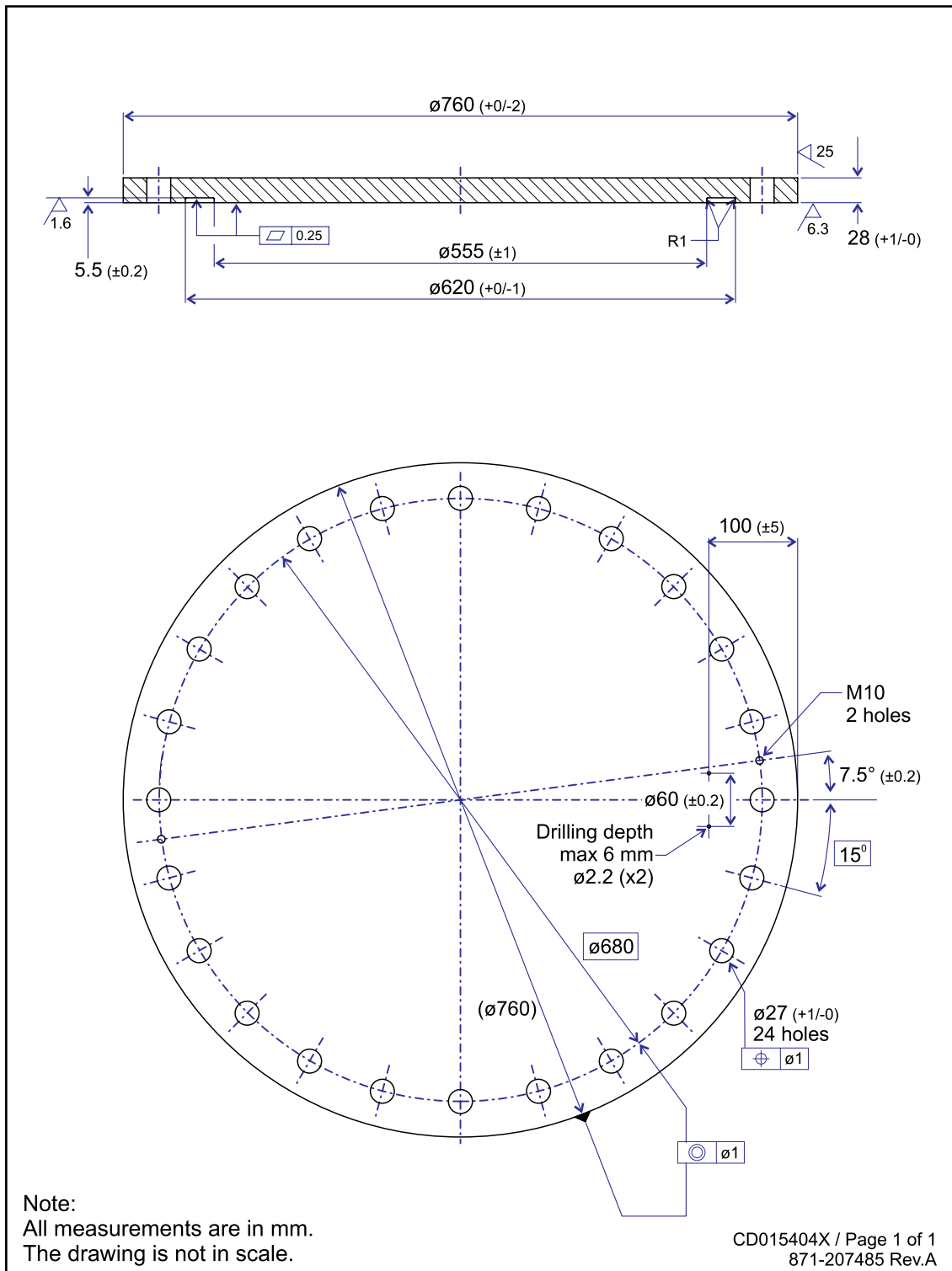
SX95 Mounting trunk dimensions



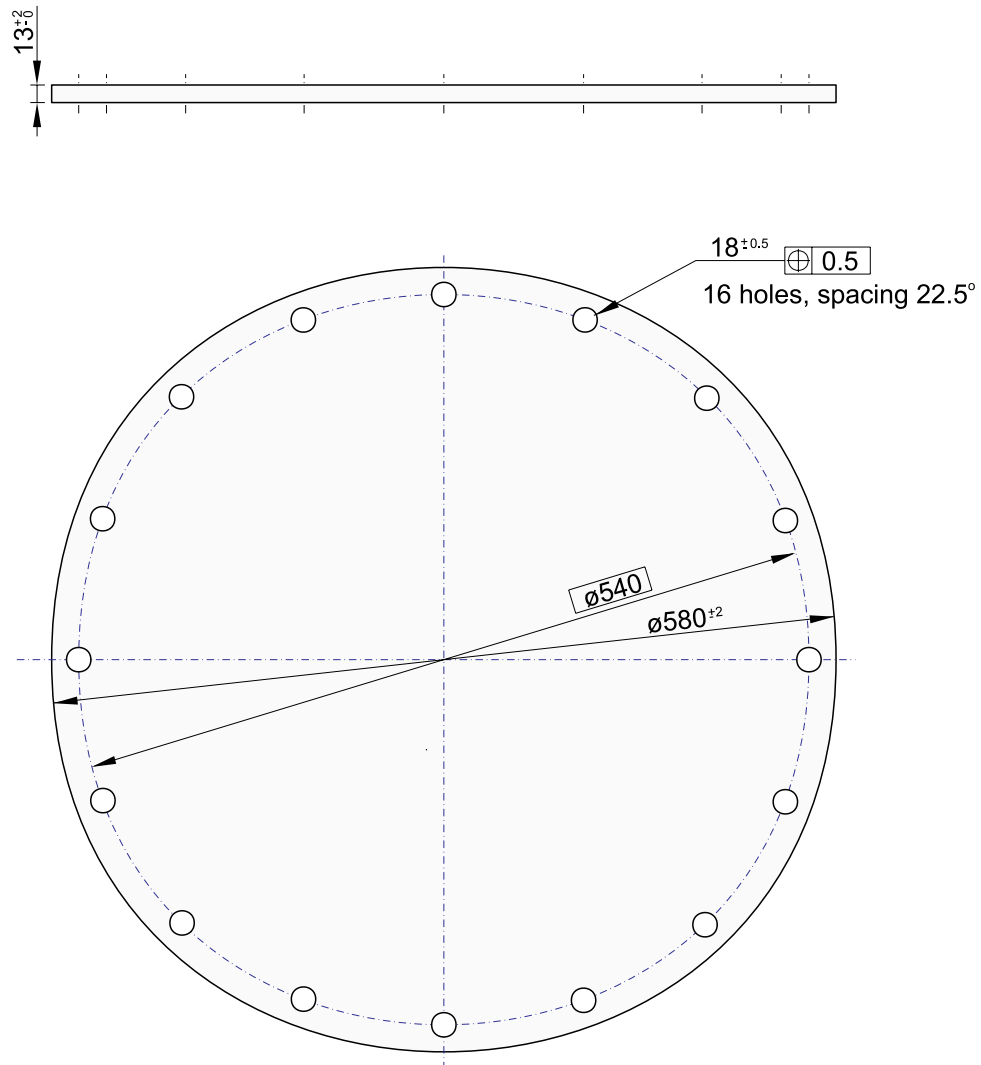
SX92/SX93 Optional trunk dimensions



SX92/SX93 Blind cover dimensions



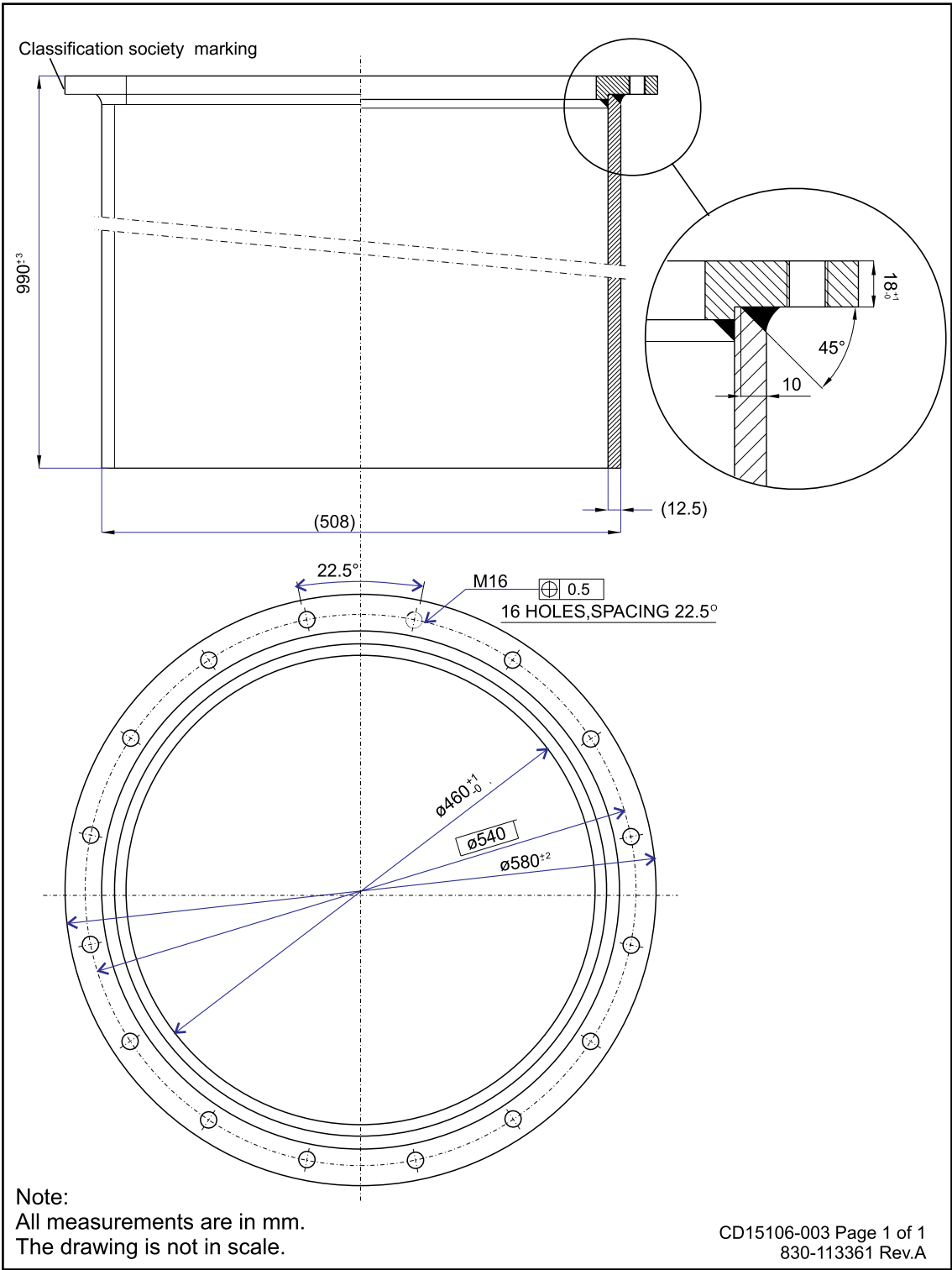
SX95 Blind cover dimensions



Note:
All measurements are in mm
The drawing is not in scale

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SX95 Mounting trunk production



COMPANY PROFILE

Simrad

Simrad is the world's most recognized brand in professional fish finding and fishery research equipment. The brand name "Simrad" is fully owned by Kongsberg Maritime AS.

Through the history of Simrad, Kongsberg Maritime AS has more than 60 years of experience in design and manufacturing of advanced fishery sonars, echo sounders and catch monitoring systems. Kongsberg Maritime will always take pride in offering the fisherman the best tools for efficient, selective and sustainable fishery. Simrad fish finding instruments have been used by professional fishermen since 1950.

Figure 16 Simrad and Kongsberg Maritime's facility in Horten, Norway



Kongsberg Maritime also provides the benchmark equipment for the world wide fishery research community. Every day, Simrad equipment is aiding scientist estimating the biomass of the oceans, a factor so important for sustainable fishery.

Visit Simrad at <http://www.simrad.com>.

Kongsberg Maritime AS

Kongsberg Maritime is a leading supplier of advanced maritime automation and instrumentation systems. We deliver systems for dynamic positioning and navigation, marine automation, cargo

management and level sensors, maritime training simulators and position reference systems. Important markets include countries with large offshore and shipyard industries. The company has approximately 3300 employees and an annual turnover of MNOK 6.425 (year 2008). Kongsberg Maritime owns subsidiaries in Spain, Canada, Italy, the Netherlands, Germany, Sweden, Singapore, China, Korea, the UK and the USA in addition to four locations in Norway. Decentralisation lets subsidiary company optimize customer relationships while providing maximum flexibility in relation to product design, production and marketing. Kongsberg Maritime currently exports its products to all of the world's major markets.

Kongsberg Maritime's main office is situated in Horten, Norway.

The premises located at Strandpromenaden in Horten houses the hydroacoustic activities. The professionals in this facility share more than 60 years of experience in single and multibeam echo sounding, sonar technology and underwater communication and instrumentation. The facility's location close to the waterfront provides excellent surroundings for the design, test and manufacturing of the advanced products. Two in-house test tanks, a sea based test station as well as two vessels are available for extensive testing and quality control.

Figure 17 Kongsberg Maritime's test and research vessel "MK Simrad Echo"



The product ranges provided by Kongsberg Maritime's Strandpromenaden facility in Horten include:

- Sonars, echo sounders and catch monitoring systems for the world's professional fishing and scientific communities
- Scientific multibeam echo sounders and sonars for the international fishery research community
- Single and multibeam echo sounders for hydrographic applications
- Underwater communication

- Underwater positioning reference systems (including the highly accurate HiPAP® system)
- Naval sonars and echo sounders (hull mounted and towed systems)
- The world renowned HUGIN remotely operated vehicle

Kongsberg Maritime AS is fully owned by the Kongsberg Group.

Visit Kongsberg Maritime at <http://www.km.kongsberg.com>.

Kongsberg Group

Kongsberg Gruppen ASA (the Kongsberg Group) is one of Norway's leading high-technology companies. With an operating revenue of MNOK 11.056 (in 2008), it is listed at the Oslo Stock Exchange. The largest shareholder is the Norwegian Ministry of Industry and Energy holding 51% of the shares. The rest is publicly owned. The Kongsberg Group operates through the following major business areas:

- Kongsberg Maritime
- Kongsberg Oil & Gas Technologies
- Kongsberg Protech Systems
- Kongsberg Defence Systems

These companies are fully owned by the Kongsberg Group. The Kongsberg Group is represented world wide.

Visit the Kongsberg Group at <http://www.kongsberg.com>.

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